



SUGAR RESEARCH AND DEVELOPMENT CORPORATION



2002-2003



INTRODUCTION

The Australian sugar industry produces raw and refined sugar from sugarcane. While on average it produces only 4% of the world sugar supply, it exports approximately 10% of the sugar traded worldwide and its net income from sugar sales in 2001–02 was approximately \$1.5 billion.

SRDC is a body within which a strategic view of the needs and opportunities for R&D in the sugar industry can be focussed, and through which appropriate research and development activities can be encouraged and funded. It is not structured to take a direct role in research.

SRDC's outputs reflect the priorities of industry and government. The outputs of knowledge and technologies to enhance the sustainable exploitation of whole-of-industry resources, to optimise crop production, transport and manufacturing systems, and the development of the human resource base all contribute to the outcome of a more profitable and sustainable sugar industry. This will enable accountability against economic, environmental and social criteria.

SRDC is a statutory authority with a mission to foster an internationally competitive and sustainable Australian sugar industry through directed funding to meet the research and development needs of the sugar industry.

In August 2001 SRDC advertised nationally for preliminary project proposals for funding to commence in 2002–03. Following consideration of new project proposals by the Board and discussions with the relevant research institutions, the final portfolio of projects was consolidated by SRDC for submission to the Parliamentary Secretary to the Minister for Agriculture, Fisheries and Forestry in this Annual Operational Plan.

CORPORATE GOVERNANCE

2.1 Enabling Legislation and Legislative Objectives

SRDC was established under the *Primary Industries and Energy Research and Development Act 1989* (the PIERD Act) on 1 October 1990. As a Commonwealth Statutory Authority it is also subject to the *Commonwealth Authorities and Companies Act 1997* (the CAC Act).

The objects of the PIERD Act are to make provision for the funding and administration of research and development relating to primary industries with a view to:

- (a) increasing the economic, environmental or social benefits to members of primary industries and to the community in general by improving the production, processing, storage, transport or marketing of the products of primary industries; and
- (b) achieving the sustainable use and sustainable management of natural resources; and
- (c) making more effective use of the resources and skills available in the community in general, and in the scientific community in particular; and
- (d) improving accountability for expenditure upon research and development activities in relation to primary industries.

2.2 Objectives of SRDC

The objectives of SRDC are directly related to the objects of the PIERD Act. They are:

- To improve the competitive position and cost efficiency of the Australian sugar industry;
- To achieve sustainable use and sustainable management of the natural resource base of the sugar industry;
- To apply industry, scientific and community resources more effectively to R&D in the sugar industry; and
- To manage SRDC resources efficiently and to improve the accountability for expenditure on R&D for the sugar industry.

2.3 Industry Representative Organisations

The PIERD Act prescribes the following representative organisations of SRDC:

- Australian Cane Growers' Council Limited;
- Australian Cane Farmers' Association Limited;
- Australian Sugar Milling Council Proprietary Limited.

SRDC is accountable to both the Commonwealth Government and these representative organisations. SRDC meets formally with the representative organisations at least twice each year to discuss SRDC activities and statutory reporting, levy arrangements, R&D priorities and any other matters of mutual interest.

No payments are to be made to the representative organisations in relation to these consultations or for any other purpose in 2002–03.

2.4 Responsible Minister — Ministerial Power of Direction

SRDC is responsible to the Federal Parliament through Senator the Hon. Judith Troeth, Parliamentary Secretary to the Minister for Agriculture, Fisheries and Forestry. The Parliamentary Secretary:

- Approves the five-year research and development plan and the annual operational plan
- Appoints directors of SRDC on the recommendation of the Sugar Research and Development Corporation Selection Committee
- Appoints the chairperson and government member of SRDC.

2.5 Management Framework

2.5.1 Corporate Structure



2.5.2 Structures, processes, controls

Directors' corporate governance of SRDC includes development of its strategic direction and desired outcomes, establishing performance indicators, policies and procedures for the operation of the Corporation, and ensuring the Corporation acts responsibly and legally within the boundaries of the PIERD Act and the CAC Act. An Audit Committee of 2 non-executive directors appointed by the Board provides advice to the Board to assist it in fulfilling its responsibilities relating to accounting, reporting and compliance practices of the Corporation.

SRDC reviews its R&D activities and management systems at its July meeting each year including a review of progress towards achieving its corporate outputs and outcome. It also considers whether the R&D Plan requires amendment. In addition, it reviews the performance of the Board and management of SRDC and considers any changes necessary to policies and operating procedures, financial reporting, reporting systems and internal controls. These are detailed in its internally developed Business Process Management System which incorporates SRDC's quality and continuous improvement mechanism.

OPERATING ENVIRONMENT

3.1 R&D Environment

Total funds available for sugar industry R&D in 2001–02 were estimated in February 2002 to be \$51 million. This total consisted of \$12.66 million provided by SRDC, \$25.94 million from R&D providers including the industry R&D organisations BSES, SRI and Cane Protection and Productivity Boards, and \$12.37 million from other sources.

A combination of events including a low sugar price, poor seasons in the past two years (resulting in lower levy payments to SRDC) and cessation of the special Commonwealth funded program CP2002 in 2002–03 and the CRC for Sustainable Sugar Production in 2003–04, will result in a reduction in funds over the next two years of approximately \$12 million. This includes a reduction in the 2002–03 SRDC budget of \$3.38 million and a consequent reduction of \$1.37 million in leveraged funds from R&D providers other than BSES and SRI.

In this funding environment, the sugar industry and SRDC in particular face four key challenges over the next two to three years as follows:

- *Directing depleted R&D funds*

Depleted R&D resources must be directed to improving cost effectiveness in the short term. There is an urgent need to promote the adoption of best practice management that will improve growers' and millers' economic performance.

There is also increasing pressure on the sugar industry to meet higher community expectations of its environmental care. The challenge for R&D is to provide the technology to improve productivity, sustain the resource base, and have minimal external impact.

While there is pressure to improve short-term cost effectiveness, there is also a challenge for SRDC to ensure R&D is in place to contribute to longer term whole-of-industry competitiveness and sustainability. Building human capacity within the sugar industry to address the increasingly complex operating environment is a high priority.

- *Maintaining the research base underpinning the industry*

SRDC was able to build the number of R&D providers from a base of 18 in 1990–91 to a peak of 37 in 2000–01. This declined to 34 in 2002–03 because of the reduction in project funds. It must now meet the challenge of maintaining a broad R&D provider base in a period of reduced resources. R&D funds must also be directed towards training future R&D personnel for the industry and at enhancing the skills and knowledge of R&D personnel already working in the industry.

- *Maintaining progress post-CP2002*

With the cessation in June 2002 of the special Commonwealth funding managed under CP2002, SRDC faces the challenge of building on the positive effects of CP2002. Significant momentum was generated by projects promoting Best Management Practice at farm level, harvesting, and at the mill level. SRDC also needs to ensure that data being generated on financial analysis of the industry and best management practice changes are disseminated as recommended by the interim external review of CP2002 conducted in June 2001.

- *Return on R&D investment*

SRDC needs to ensure that technology capable of delivering potential benefits is adopted by the industry through approaches such as participative action learning. It also must quantify at regular intervals the benefits delivered to both the industry and community.

The Australian sugar industry and its R&D community continue to face the most difficult period in a decade with low crop yields combined with low sugar prices. SRDC believes that there are significant gains to be made through the adoption of systems level approaches, as endorsed by the interim external review of CP2002. SRDC is therefore in the process of revising its R&D Plan to encourage the R&D community to adopt systems level thinking in its planning and execution of R&D.

3.2 Stakeholders

The stakeholders of SRDC include the growers and millers of the Australian sugar industry, the Commonwealth Government, R&D organisations, agribusiness and the community.

3.3 Stakeholder R&D Priorities

In developing its current R&D Plan 1999–2004, SRDC consulted its stakeholders to develop the needs and opportunities for R&D during the five years ahead. It took into account:

- Industry priority issues
- Views of R&D Organisations and Agribusiness
- Commonwealth Government Priorities

In November 2001, the SRDC Board decided to proceed with a revision of its R&D Plan to be completed by April 2003.

3.3.1 Industry R&D Provider and Agribusiness Priorities

For the R&D Plan 1999–2004, the industry, R&D providers and other stakeholders cooperated in a series of regional seminars to revise industry priorities.

The industry priorities used in developing the R&D Plan 1999–2004 were:

1. Sugar/cane quality
2. Efficient use of capital
3. Varieties for high/early/late CCS
4. Harvester performance, design and measurement issues
5. Pest/disease/weed control, using IPM, quarantine issues
6. High Density Planting and efficient planting systems
7. Adoption and extension
8. New brands/product diversification
9. Disposal and re-use of mill mud/ash
10. Water use efficiency.

SRDC and its key stakeholders then used a benefit model across the sugar industry value chain to provide estimates of where maximum benefits to the industry and community would accrue from R&D investment. These estimates guided the indicative funding allocations to the R&D programs.

3.3.2 Commonwealth Government Priorities

In December 1999 the Minister for Agriculture, Fisheries and Forestry and his portfolio colleagues reviewed the Government's priorities for rural research and development and issued the following updated priorities:

- Sustainable management and use of our soil, water, air, vegetation and fauna resources integrated into farming and land use systems
- A whole of industry approach to production, processing and marketing to ensure the chain works to its best advantage
- Development of biotechnology, along with sensitive handling to accommodate consumers' concerns
- Trade and market access negotiations
- Maintenance and enhancement of our clean green image
- Addressing food safety concerns of consumers
- Cultivating creativity and innovation among our human resources

In essence the Commonwealth Government aims to promote and develop competitive, profitable and sustainable Australian agriculture, food, fishing and forest industries which promote economic development and job creation, particularly in rural and regional Australia. The investment in R&D is made with the expectation that the returns would benefit not only the industries directly, but also the wider community. To achieve this the areas of investment must be broadly focussed across economic and trade activity, must deliver socially desirable outcomes, and must preserve our natural resource base for future generations.

3.4 SRDC Priorities for 2002–03

After considering gaps in its R&D Portfolio, SRDC, in its general call for preliminary project proposals in August 2001, indicated that the following had been identified as priorities for 2002–03:

- Whole-of-industry optimisation
- Implementation of best management practices for farming, harvesting and milling
- Scoping studies to identify the constraints to adoption of sustainable and profitable farming, harvesting, distribution and milling systems
- Sugarcane crop physiology and integrated pest management

The four working parties and the Board took these priorities into account in assessing new projects to commence in 2002–03.

3.5 Ecologically Sustainable Development

SRDC is placing increased emphasis on the social impacts of environmental management, consistent with the 1999 report of the Productivity Commission on the Implementation of ESD by Commonwealth Departments and Agencies. SRDC recognises that environmental, economic and social sustainability are increasingly recognised locally and internationally for all sectors of the economy.

SRDC manages its R&D activities to address ESD in two broad ways:

- The impact of sugar industry production and processing activity on other ecosystems (including social impacts);
- The development of industry practices which maintain and/or enhance the economic viability of sugar production and processing and the industry's natural resource base.

R&D to address these issues is conducted in System Programs B (Sustainable Farming Systems) and C (Efficient Processing and Distribution Systems). This integrated approach aligns with the Government's ESD strategy. SRDC strategies to address this complex area will take into account the following related activities:

- The Code of Practice for Sustainable Cane Growing in Queensland;
- The NSW Sugar Industry's Best Practice Guidelines for Acid Sulphate Soils;
- The operations of GBRMPA, AIMS, the CRC for Sustainable Sugar Production and the CRC for the Great Barrier Reef World Heritage Area;
- The R&D conducted on natural resource management by state agencies;
- The legislative framework of the Commonwealth and State Governments.

All these activities will underpin the sugar industry's stewardship of its resource base and R&D is a vital component in achieving these objectives.

3.6 Public Good R&D

Benefits to the broader community, including benefits beyond the sugar industry, will be a major outcome from more than 51% of the projects included in this AOP.

Projects delivering benefits to the broader community include 10 projects in System Programs B and C which aim to minimise the impact of the sugar industry on other ecosystems. A further 17 projects (19% of the portfolio) are aimed at preventing or ameliorating degradation of the natural resource base within sugar production and manufacturing sectors, or providing benefits to the wider community through contributions to training and communication. These include projects to develop varieties resistant to pests and diseases, to develop integrated pest management systems and reduce pesticide use, to make more efficient use of the water resource, to develop reduced tillage systems, to ameliorate soil acidity and sodicity, to improve catchment drainage and to achieve the adoption of sustainable nutrient management strategies.

Twenty projects (22% of the portfolio) in sugarcane production and sugar manufacturing systems will also provide benefits beyond the Australian sugar industry. These are strategic research projects in the areas of genetic introgression, crop physiology, biotechnology, data analysis, plant pests and diseases, and various aspects of modelling milling operations.

CP2002 — ACCELERATED ENHANCEMENT OF PRODUCTIVITY AND PROFITABILITY FOR THE AUSTRALIAN SUGAR INDUSTRY

CP2002 is a multi-program activity outlined in the SRDC R&D Plan 1999–2004 and was established to manage the special allocation of \$13.45 million announced by the then Minister in July 1998. This allocation was used for sugar industry R&D over a four year period from 1998 to 2002 to address problems of sugar content, pest control and associated productivity issues. It supplements the Commonwealth Government's current contribution to sugar R&D under the PIERD Act and is managed by SRDC consistent with its obligations to the Australian sugar industry and the Commonwealth Government.

4.1 Activities in 2002–03

Most projects funded with the special Commonwealth Government allocation for CP2002 are expected to be completed by 30 June 2002 but four projects and one consultancy are likely to be completed during 2002–03. These are:

- BSS232 Improved nutrient management in the Australian sugar industry
- CLW009 Improving yield and CCS through use of silicon based amendments
- DPI014 Sugar farming systems development and demonstration on the wet tropical coast
- SRI088 Increasing milling unit capacity by improving mill feeding performance
- Consultancy to evaluate harvester performance

These projects have encountered delays due to climatic and disease events, or have further options to explore using advanced modelling technology.

A total of \$0.119 million is expected to be required for completion of these activities in 2002–03.

OUTCOMES AND OUTPUTS

5.1 SRDC Outcome

SRDC's outcome is:

Enhanced international competitiveness, profitability and sustainability of the Australian sugar industry.

This outcome is consistent with the Agriculture, Fisheries and Forestry portfolio outcome of more sustainable competitive and profitable Australian agricultural, food, fisheries and forestry industries.

5.2 SRDC Outputs

The SRDC outputs have changed since 2001–02 because SRDC is moving towards a systems-based R&D structure, as discussed in the Preface on page vii.

The outputs in 2002–03 (see Figure 1) reflect the four systems programs which incorporate the strategies of the multiple programs in the SRDC's current five year R&D Plan (1999–2004). Figure 1 shows the contribution of the four outputs to SRDC's overall outcome in 2002–03. SRDC expects to complete a revision of its R&D Plan by May 2003 so that the new Plan can commence from 2003–04.

Figure 1 — Relationship between Outcomes and Outputs in 2002–03

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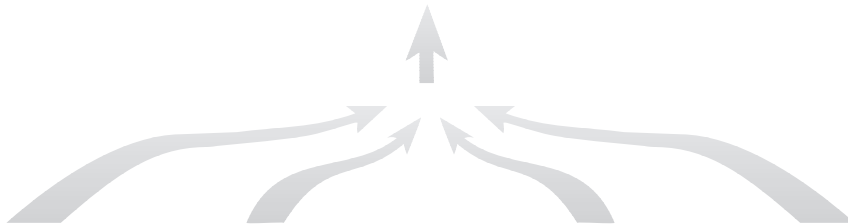
Chairperson: Mr Clive Hildebrand
 Executive Director: Dr Russell Muchow

OUTCOME:

Enhanced international competitiveness, profitability and sustainability of the Australian sugar industry.

Total Revenue from Independent Sources: \$9.985m

Total Cost of Outputs: \$9.276m.



OUTPUT 1: (System A)

Knowledge, technologies and implementation processes to optimise the use of whole-of-industry resources by exploiting linkages and interdependencies across the industry value network to maximise economic, environmental and social benefits.

**Total Cost: \$0.593m (02–03)
 \$1.355m (01–02)**

OUTPUT 2: (System B)

Knowledge, technologies and implementation processes for best utilisation of biophysical resources and management inputs for profitable sugarcane production in harmony with the environment and community.

**Total Cost: \$5.539m (02–03)
 \$7.701m (01–02)**

OUTPUT 3: (System C)

Knowledge and technologies to improve the design and implementation of harvesting, transport and milling processes for greater cost efficiency, expanded product range and enhanced product quality, consistent with environmental and social responsibility.

**Total Cost: \$2.366m (02–03)
 \$2.140m (01–02)**

OUTPUT 4: (System D)

Enhanced human skills and physical R&D capacity to maximise economic, environmental and social benefits from sugar industry R&D.

**Total Cost: \$0.778m (02–03)
 \$1.463m (01–02)**

5.3 Outcome — Resourcing

The total revenue for SRDC including industry levies, Commonwealth matching contribution and CP2002 for 2002–03 for the SRDC outcome is shown in Table 1 with 2001–02 data for comparison.

Table 1 2002–03 SRDC Budget

	\$m 2001–02	\$m 2002–03
Estimated Crop Size (cane)	35.7 mt	38.5 mt
Levy rate/tonne	\$0.12	\$0.14
INCOME		
Industry Contribution	4.282	5.391
Commonwealth Contribution	4.267	4.315
CP2002	3.263	0.119
Interest / Other	0.210	0.160
TOTAL INCOME	12.022	9.985
EXPENDITURE PIERD PROGRAM		
Continuing Projects	7.634	5.602
New Projects	0	1.545
Subtotal	7.634	7.147
Contingency for New Projects	0.050	0.129
TOTAL PROJECTS	7.684	7.276
Research Administration	0.475	0.450
Operation of SRDC	1.000	1.016
Capital	0.000	0.015
Contingency	0.500	0.400
TOTAL PIERD	9.359	9.157
EXPENDITURE CP2002 — Continuing Projects	3.000	0.119
TOTAL EXPENDITURE	12.659	9.276

The distribution of SRDC funds among its major research providers is presented in Table 2.

Table 2 Proposed SRDC Expenditure by Research Organisation and Other Activities 2002–03 (excludes contingency)

	\$m	%
BSES	3.76	43
SRI	0.81	9
CSIRO	1.14	13
UQ	0.20	2
JCU	0.13	2
NSWSMC	0.19	2
OTHER PROVIDERS	1.05	12
OTHER ACTIVITIES	1.47	17
TOTAL	8.75	100

5.4 Performance Information for Outcome and Outputs

The effectiveness of SRDC's R&D programs in achieving its overall outcome is assessed by the indicators given in Table 3.

Table 3 Performance indicators and measures for the effectiveness of SRDC's activities in achieving its outcome

Performance information for SRDC Outcome — Effectiveness

Indicator	Measure
1. Economic returns from SRDC investments in excess of a benefit:cost ratio of 5:1, as well as non-monetary and public good benefits for the community from strategic and environmental research	1(a) Benefit:Cost analyses of completed R&D and its resultant benefits 1(b) Assessment of progress towards achieving program outputs as a measure of progress towards producing the corporate outcome.
2. Alignment of SRDC's priorities and plans with those of industry and the Commonwealth Government.	2. SRDC's outputs aligned with industry and government priorities: outputs derived from quality R&D projects and are consistent with expected industry and community benefits; approval of SRDC actions by the Minister and acceptance by the industry.

Performance Information for SRDC's four Outputs in 2002–03 is presented in Table 4.

Table 4 Performance Information for SRDC Outputs

Output	Indicator and Measure
<i>Common to Outputs 1, 2, 3 & 4</i>	<p><i>Quality:</i></p> <ul style="list-style-type: none"> • Accountability to SRDC of its research providers measured by unapproved carryovers at end of financial year (milestones not submitted or accepted) equivalent to less than 5% of budget • Accountability is also achieved through monitoring project milestones, financial reporting requirements and reviews to ensure delivery of output <p><i>Economic:</i></p> <ul style="list-style-type: none"> • Adoption of at least one new technology to: <ul style="list-style-type: none"> — improve sugar mill throughput — improve sugar cane productivity — improve whole-of-industry profitability <p><i>Environmental:</i></p> <ul style="list-style-type: none"> • Acceptance of environmental codes of practice by 80% of the industry in NSW and Queensland to reduce environmental impacts, measured by producer survey <p><i>Social:</i></p> <ul style="list-style-type: none"> • Human resource development via funding of scholarships • Improved OH&S in the sugar industry • Producers involved in participatory R&D
<i>Specific to individual outputs</i>	
<i>Output 1 Knowledge, technologies and implementation processes to optimise the use of whole-of-industry resources by exploiting linkages and interdependencies across the industry value network to maximise economic, environmental and social benefits.</i>	<i>Quantity and cost:</i> 3 new and 4 continuing contracts (projects) costing an average of \$60,280 per project
<i>Output 2 Knowledge, technologies and implementation processes for best utilisation of biophysical resources and management inputs for profitable sugarcane production in harmony with the environment and community.</i>	<i>Quantity and cost:</i> 9 new and 45 continuing contracts (projects) costing an average of \$75,277 per project

Output	Indicator and Measure
<p>Output 3 <i>Knowledge and technologies to improve the design and implementation of harvesting, transport and milling processes for greater cost efficiency, expanded product range and enhanced product quality, consistent with environmental and social responsibility.</i></p>	<p><i>Quantity and cost:</i> 2 new and 21 continuing contracts (projects) costing an average of \$66,312 per project</p>
<p>Output 4 <i>Enhanced human skills and physical R&D capacity to maximise economic, environmental and social benefits from sugar industry R&D.</i></p>	<p><i>Quantity and cost:</i> 3 new and 3 continuing contracts (projects) costing an average of \$50,381 per project and 4 new and 13 continuing scholarships costing an average of \$16,365 per scholarship</p>

EXTENT TO WHICH ANNUAL OPERATIONAL PLAN GIVES EFFECT TO THE R&D PLAN

6.1 Systems-based Portfolio Structure

As indicated in the preface on page vii, SRDC is moving towards a systems-based R&D portfolio structure, initially during 2001–02 and 2002–03 within the bounds of the SRDC R&D Plan 1999–2004, leading to full implementation with the development of a new R&D Plan in 2003–04.

This will be based upon four value systems or programs:

- A Competitive Whole-of-Industry Systems
- B Sustainable Farming Systems
- C Sustainable Processing and Distribution Systems
- D Industry Development

In all these value systems or programs, R&D investment is planned to deliver economic, environmental and social benefits.

In adopting the systems structure for this Annual Operational Plan, SRDC recognises:

- The interim review of CP2002 which recommended that SRDC continue to provide leadership in alerting the industry to the gains to be made from system level approaches and that in this context SRDC:
 - Provide R&D support for changes in industry-wide structures, relationships and price signals that are impeding the profitability of the industry; and
 - Increase the focus on R&D for farming systems relative to individual practices and disciplines.

In discussing Future Directions, the CP2002 Review Report states that “R&D priorities for the sugar industry need to be set not in the context of individual sectors, but in the context of whole-of-industry arrangements that can maximise returns to the industry as-a-whole and to growers, harvester operators and millers”.

- Increasing sugar industry support for a whole-of-industry perspective in R&D
- Current SRDC funded research which indicates that there are substantial gains to be made from a more integrative approach.

6.2 Strategies of the Systems-based Portfolio

The four Systems Programs used in this Annual Operational Plan embrace all of the strategies of the eight R&D programs in the SRDC R&D Plan 1999–2004.

Because there were no new projects funded in 2001–02, there are a number of strategies in which there are no current projects in this Annual Operational Plan. New projects recommended for funding in 2002–03 reduced the number of gaps in the portfolio. In addition the strategies are being reviewed as part of the process of revising the R&D Plan to ensure that they are appropriate for addressing current priorities.

R&D ACTIVITIES IN 2002–03 WITHIN THE FOUR SYSTEMS PROGRAMS

A Competitive Whole-of-Industry Systems

The focus of Competitive Whole-of-Industry Systems is to deliver options for best use of industry resources with emphasis on improving the efficiency of industry as a whole. Efficiencies are sought by exploiting linkages and interdependencies across the industry value network. Strategies are required to enable the sugar system to respond better to drivers such as climate and market signals, capital infrastructure, operational culture and product quality, in optimizing the whole sugar system.

Outcome

Improved decision making processes for land use planning, enhanced understanding of the impacts of industry components on whole-of-industry competitiveness and an optimised harvest transport system using best practice management.

Output

Knowledge, technologies and implementation processes to optimise the use of whole-of-industry resources by exploiting linkages and interdependencies across the industry value network to maximise economic, environmental and social benefits.

Projects funded within this System Program address the Commonwealth Government priority of adoption of a whole-of-industry approach which is also an issue of increasing priority to industry. Projects to be funded in 2002–03 will address the effect on industry profitability of different cane supply options in a number of mill areas as well as seeking to improve technology transfer and training of industry leaders. In addition the use of seasonal climate forecasting to improve industry competitiveness will be evaluated.

Strategies

The strategies addressed in 2002–03, together with the projects funded within them, are listed in Attachment A.

B Sustainable Farming Systems

The focus of Sustainable Farming Systems is to develop and enhance strategies for best utilizing resources (varieties, soil, water, nutrients) given the variable drivers of climate, pest and disease incidence, cost/price structures and social structures. These strategies would address the multiple goals of sustainability ie. profitability, resource maintenance, and environmental impact. The systems would operate using best health, safety and environmental practice and operate in harmony with the community. The key outcome would be best management practice on utilization of resources in the farming sector.

Outcome

Enhanced sustainability of crop production through adoption of improved varieties, new crop management, protection and farming systems techniques, reduced impacts on other ecosystems and a healthy and safe working environment for industry personnel.

Output

Knowledge, technologies and implementation processes for best utilisation of biophysical resources and management inputs for profitable sugarcane production in harmony with the environment and community.

Projects funded within this System Program specifically address the Commonwealth Government priorities to invest in and manage biotechnology, sustainable natural resource management, maintenance and enhancement of our clean green image and improving food safety. Specifically, projects in 2002–03 will seek to identify and incorporate non-sugarcane genes into sugarcane to improve pest resistance and product quality. Crop management practices which improve industry profitability while maintaining the natural resource base are being developed through more sustainable fertiliser, crop protection and harvest technologies. Other projects specifically aim to reduce the movement of sediments, nutrients and chemicals from farms to other ecosystems and to improve the health and safety of industry personnel. These projects also address high priority industry issues.

Strategies

The strategies addressed in 2002–03, together with the projects funded within them, are listed in Attachment A.

C Sustainable Processing and Distribution Systems

The focus of Sustainable Processing and Distribution Systems is to improve the design of the harvesting/transport/milling processes for greater cost efficiency. There would also be a focus on the logistics of distribution of cane for milling and of sugar for shipping. The systems would operate using best health, safety and environmental practice and operate in harmony with the community. In addition, there is a need to be able to produce a broad range of products both cost effectively and responsive to market signals.

Outcome

Improved efficiency of the harvest/transport system, production of sugar of a quality required by the market through enhanced manufacturing processes, reduced impact of cane transport and manufacturing processes on other ecosystems and a healthy and safe working environment for industry personnel.

Output

Knowledge and technologies to improve the design and implementation of harvesting, transport and milling processes for greater cost efficiency, expanded product range and enhanced product quality, consistent with environmental and social responsibility.

Projects funded within this System Program address the Commonwealth Government priorities of increasing trade and market access, improving food safety, sustainable natural resource management and maintaining our clean, green image in addition to high priority sugar industry issues. Projects funded in 2002–03 will be aimed at improving cane harvester design, improving the profitability of sugar mill processing by enhancing the capacity of current equipment, improving sugar quality to maintain and enhance Australia's reputation in overseas markets, and exploring new uses for milling by-products. R&D will also continue on increasing the product range and improving health and safety in sugar mills.

Strategies

The strategies addressed in 2002–03, together with the projects funded within them, are listed in Attachment A.

D Industry Development

The focus of Industry Development is the enhancement of the core skills and physical R&D capacity of the industry. It will also focus on developing leadership capability in the sugar industry and enhancing the human resource skills available for sugar industry and community R&D.

Outcome

Economic, environmental and social benefits delivered to the industry through a skilled human resource base utilising an enhanced industry R&D capacity.

Output

Enhanced human skills and physical R&D capacity to maximise economic, environmental and social benefits from sugar industry R&D.

Projects funded within this System Program address the Commonwealth Government priority of human resource development. The development of its current and future human resource base is also a high priority for the sugar industry.

Strategies

The strategies addressed in 2002–03, together with the projects funded within them, are listed in Attachment A.

ATTACHMENT A

PROJECTS AND SCHOLARSHIPS IN 2002–03

Project	Title	Duration	Contact	Funds 2002–03
System A Competitive Whole of Industry System				
<i>Strategy A6 Decision-making for industry profitability</i>				
Continuing Projects				
CTA036	Seasonal climate forecasting to improve industry competitiveness (SRC6)	Jan 99–Dec 02	Dr Yvette Everingham	\$59,515
SRI106	Electronic collection of harvest/transport data	Jul 00–Aug 02	Mr Peter Everitt	\$48,151
SRI107	Improved Transfer to Mills of Technology Developed by the Sugar Research Institute	Jul 00–May 04	Dr Victor Mason	\$13,798
New Projects				
CSE003	Adoption pathways for alternative cane supply options across the sugar industry	Jul 02–Jul 05	Dr Andrew Higgins	\$43,968
<i>Strategy A7 Value network impacts on competitiveness</i>				
Continuing Projects				
CPI003	Integrated management of ash and colour in the field	Jul 00–May 03	Dr Phillip Jackson	\$128,768
<i>Strategy A8 Enhanced risk management across the value network</i>				
New Projects				
CSE004	Improving yield forecasting capability to enhance market strategies for the Australian	Jan 03–Aug 05	Dr Yvette Everingham	\$69,902
CSE005	Integrating and optimising farm-to-mill decisions to maximise industry profitability	Jul 02–Jul 06	Dr Andrew Higgins	\$57,856
Total for System A				\$421,958

Project	Title	Duration	Contact	Funds 2002–03
System B	Sustainable Farming Systems			
Strategy B1	<i>Efficiency and effectiveness of sugarcane breeding</i>			
<i>Continuing Projects</i>				
BSS179	Development of a strategy for selection of high-CCS cultivars for high fertility environments in northern Queensland	Jul 97–Mar 04	Dr Nils Berding	\$48,000
BSS231	Development and application of spatial analysis to improve precision in selection trials	Feb 00–Jul 03	Miss Joanne Stringer	\$14,500
BSS237	Identification of canegrub-resistant transgenic sugarcane lines for commercial evaluation	Jul 99–Jul 03	Dr Peter Allsopp	\$77,662
BSS242	A sugarcane tissue culture system for mass propagation and transformation	Jul 99–May 03	Dr Grant Smith	\$244,678
BSS250	Improving selection systems and data analysis in sugarcane breeding programs	Jul 00–Jan 06	Dr Phillip Jackson	\$104,813
CTA028	Evaluation and re-structuring of regional selection programs to maximise efficiency and speed of cultivar release	Jul 97–Jul 03	Dr Scott Chapman	\$70,000
CTA046	Perfect markers for sugarcane mapping	Jul 99–Oct 02	Dr Lynne McIntyre	\$15,045
CTA048	The transfer of high CCS traits from wild relatives to sugarcane using biochemical	Jul 99–Jul 03	Dr Christopher Grof	\$104,573
CTA049	Characterisation and maintenance of the Australian sugarcane mapping populations	Jul 99–Aug 03	Dr Lynne McIntyre	\$71,159
<i>New Projects</i>				
BSS255	Improving the plant breeding selection system for Fiji disease resistance	Jul 02–Sep 05	Mr Barry Croft	\$63,244
BSS256	Reducing the Australian sugar industry's genetic vulnerability to sugarcane smut	Jul 02–Apr 07	Mr Barry Croft	\$14,500

Project	Title	Duration	Contact	Funds 2002–03
Strategy B2	<i>Genes for novel traits</i>			
Continuing Projects				
CPI002	Functional genomics for enhanced sugar accumulation in sugarcane	Jul 00–Jul 03	Dr John Manners	\$103,352
CTA047	Introgression of new genes from <i>Saccharum officinarum</i>	Jul 99–Jul 04	Dr Phillip Jackson	\$132,079
ICB007	Isolation of sugarcane proteins involved in post-transcriptional gene silencing	Jul 01–Jul 03	Dr Erik Mirkov	\$10,000
ICB008	A sugarcane gene map	Jul 01–Jul 03	Prof Andrew Paterson	\$30,000
ICB009	Map-based cloning of a rust resistance gene in sugarcane	Jul 02–Oct 05	Dr Angelique D'Hont	\$14,000
New Projects				
UQ039	Gene control sequences for metabolic engineering in sugarcane	Jul 02–Jun 05	Dr Robert Birch	\$50,000
Strategy B3	<i>Improved uptake of new varieties</i>			
Continuing Projects				
BSS196	Selection and commercial use of early CCS varieties	Jul 97–Jul 03	Mr Alan Rattey	\$7,000
Strategy B4	<i>Sustainable crop management</i>			
Continuing Projects				
BSS143	Strategic tillage to reduce soil structural degradation and improve productivity	Jul 98–Feb 04	Dr Alan Garside	\$0
BSS181	Increasing sugarcane productivity through development of integrated surface drainage systems for low lying canelands	Jul 97–Jan 03	Mr John Reghenzani	\$10,576
BSS199	Improving the management of acid and sodic soils with green trash retention using calcium based ameliorants/products	Jul 98–Aug 02	Dr Bernard Schroeder	\$6,712
BSS212	Investigation of the limits to high density planting	Jul 98–Jul 02	Mr Julian Collins	\$4,150

Project	Title	Duration	Contact	Funds 2002–03
BSS232	Improved nutrient management in the Australian sugar industry (CP2002)	Jul 99–Apr 03	Dr Bernard Schroeder	\$57,147
BSS241	Regional evaluation of high density planting	Jul 99–Mar 03	Mr Julian Collins	\$100,000
CLW009	Improving yield and ccs in sugarcane through the application of silicon based amendments	Jul 99–Sep 02	Dr Andrew Noble	\$14,112
CSE001	Increased profitability and water use efficiency through best use of limited water under supplementary irrigation	Sep 00–Sep 05	Dr Geoffrey Inman-Bamber	\$21,885
CTA022	Short and long term impacts of green cane trash blanketing on soil fertility	Jul 96–Jul 02	Dr Peter Thorburn	\$10,000
CTA029	Monitoring cane at the mill to improve nitrogen management on the farm	Jul 97–Aug 02	Dr Brian Keating	\$12,965
CTA038	Irrigation risk management strategies to reduce water use and maximize profitability: a paradigm shift in performance to \$ per unit of water	Jul 98–Oct 02	Dr Geoffrey Inman-Bamber	\$10,000
DPI014	Sugar farming systems development and demonstration on the wet tropical coast	Jul 99–Sep 02	Mr Dick Steel	\$20,000
NISN01	National Irrigation Science Network	Jul 00–Jul 02	Mr Jeremy Cope	\$10,000
<i>New Projects</i>				
CPI005	Adapting soybean for profitable rotations in sugarcane farming systems	Jul 02–Sep 05	Dr Andrew James	\$27,247
CSE007	Implementation of irrigation practices for profitable resource efficient sugarcane	Jul 02–Jun 06	Dr Geoff Inman-Bamber	\$54,873
CSE008	Review of nitrogen fertiliser research in the Australian sugar industry	Mar 02–Dec 02	Dr Peter Thorburn	\$22,364

Project	Title	Duration	Contact	Funds 2002–03
Strategy B5	<i>Crop establishment and machinery</i>			
Continuing Projects				
BSS208	Improving planting systems for sugarcane	Sep 98–Oct 03	Mr Brian Robotham	\$134,656
Strategy B6	<i>Farm business management</i>			
Continuing Projects				
BSS217	Coordinated farm business management for the Australian sugar industry	Jan 99–Oct 03	Mr Evan Burt	\$100,210
CSR026	A reference booklet for canegrowers on the nutrition and fertilizing of sugarcane for different soil types	Jul 98–Aug 02	Dr Andrew Wood	\$10,000
Strategy B7	<i>Integrated pest management</i>			
Continuing Projects				
BSS239	Support for an ARC project to investigate genetic diversity of <i>Clavibacter xyli</i> subsp. <i>xyli</i>	Jul 99–Jul 02	Dr Stevens Brumbley	\$1,000
CTA043	Provision of improved varieties and pathology services for the Ord Sugar Industry	Jul 98–Jul 03	Dr Phillip Jackson	\$39,452
New Projects				
BSS257	GrubPlan 2: Developing improved risk assessment and decision-support systems for managing greyback canegrub	Jul 02–Sep 06	Mr Warren Hunt	\$91,706
Strategy B8	<i>Incursion management</i>			
Continuing Projects				
BSS214	Screening of Australian germplasm for resistance to sugarcane smut	Jul 98–Mar 04	Mr Barry Croft	\$70,500
BSS249	Preparedness for borer incursion	Jul 00–Sep 03	Dr Peter Allsopp	\$55,415
New Projects				
BSS258	Assessing the impact that pathogen variation has on the sugarcane breeding program	Jul 02–May 05	Dr Kathy Braithwaite	\$3,000

Project	Title	Duration	Contact	Funds 2002–03
Strategy B9	<i>Soil health</i>			
Continuing Projects				
SAI001	Preparation of a CD Rom library of plant-parasitic nematodes	Oct 98–Aug 03	Dr Jackie Nobbs	\$5,007
YDV002	Sugar Yield Decline Joint Venture (Phase 2)	Jul 99–Jun 05	Dr Alan Garside	\$599,865
Strategy B11	<i>Sustainable use of land and water resources</i>			
Continuing Projects				
BSS202	Resource assessment for sustainable land development and management of new canegrowing areas	Jan 99–May 03	Ms Kylie Webster	\$45,592
CLW007	Quantifying and managing sources of sediments and nutrients in low-lying canelands	Jul 98–Jul 02	Dr Christian Roth	\$3,888
CRC001	Contribution to the CRC for Sustainable Sugar Production	Feb 96–Jan 03	Prof Robert Lawn	\$114,300
JCU024	Water quality and unexplained fish kills in sugarcane districts of northern Queensland	Jul 00–Oct 02	Prof Richard Pearson	\$3,000
NA003	Hydrologic effects of flood gate management on coastal floodplain agriculture — the sugarcane component	Jul 99–Jun 04	Mr Peter Slavich	\$32,805
NSC003	Improving the quality of drainage water from NSW canelands	Jul 99–Oct 02	Mr Rick Beattie	\$7,932
Strategy B12	<i>Occupational health and safety</i>			
Continuing Projects				
OHS002	Farm Health and Safety R&D Program 2002–2006	Jul 02–Sep 06	Dr Roslyn Prinsley	\$20,000
Strategy B13	<i>Systems analysis capability</i>			
New Projects				
CSE006	Review of knowledge of sugarcane physiology and climate-crop-soil interactions	Jul 02–Jan 04	Dr Geoff Inman-Bamber	\$0

Project	Title	Duration	Contact	Funds 2002–03
Strategy	B16	<i>Core competency</i>		
Continuing Projects				
BSS254B	Support for core competence in strategic activities conducted by BSES (System B)	Jul 01–Jun 04	Mr Eoin Wallis	\$1,098,000
NSC004	Maintaining and enhancing core skills and capabilities within the NSW SMC for a sustainable NSW sugar industry	Jul 01–Jul 03	Mr Greg Messiter	\$120,000
Total for System B				\$4,112,964
System C Sustainable Processing and Distribution Systems				
Strategy	C2	<i>Harvesting, haulout and transport design</i>		
Continuing Projects				
BSS252	Enhancing cane harvester design for optimum feeding performance when harvesting heavy lodged crops	Jan 01–Jun 04	Mr Rod Davis	\$176,226
JCU019	Close-range, microwave radar for automatic control of base-cutter height and other cane harvester operations	Jul 99–Jul 02	Dr Graham Woods	\$5,000
New Projects				
SRI118	Measuring the benefits of the SRI integrated base cutter and crop divider height control system, and the Copersucar floating base cutter	Jul 02–Jun 03	Dr Matthew Schembri	\$75,659
Strategy	C3	<i>Efficiency of sugar mill processing</i>		
Continuing Projects				
JCU020	Experimental and numerical investigation to improve the dewatering of prepared sugar cane and bagasse	Jul 99–May 03	Assoc Prof Jeff Loughran	\$150,268
JCU021	An experimental study of boiling in calandria tubes	Jul 99–Sep 02	Dr Philip Schneider	\$25,000
JCU023	Investigation, design and preliminary testing of juice separation technology	Jul 00–Jun 03	Assoc Prof Jeff Loughran	\$109,758

Project	Title	Duration	Contact	Funds 2002–03
SRI083	Storage of liquor and other pan stage materials for later processing	Jul 98–Aug 02	Dr Ross Broadfoot	\$9,339
SRI088	Increasing milling unit capacity by improving mill feeding performance	Feb 99–Nov 02	Mr Geoff Kent	\$25,957
SRI095	Fundamental studies on the chemistry of clarification	Jul 99–Jun 03	Dr William Doherty	\$99,213
SRI101	An improved stirrer design for increased productivity and energy efficiency in batch pans	Jul 00–Apr 03	Dr Ross Broadfoot	\$24,587
SRI102	An improved roll shell material for longer life	Jul 00–Aug 02	Dr Gaye Davy	\$21,000
SRI116	Measurements of bagasse behaviour at delivery nip compactions in a rolling mill	May 02–Sep 02	Mr Floren Plaza	\$2,211

New Projects

SRI119	Clarification of A molasses	Jul 02–Jul 03	Mr Rod Steindl	\$80,976
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Strategy C4 *Processing for enhanced sugar quality*

Continuing Projects

SRI100	Clarification of evaporator syrup for improved sugar quality and yield	Jul 00–May 03	Mr Rod Steindl	\$36,186
SRI117	Evaluation of oxidative decolourants	May 02–Sep 02	Mrs Anne Sumpter	\$1,000

Strategy C5 *Increased product range*

Continuing Projects

US001	Activation of the fibrous components of sugar cane for adsorption of heavy metals	Jun 98–Oct 02	Dr Marjorie Valix	\$1,000
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Strategy C6 *Reduced environmental impacts*

Continuing Projects

SRI077	Microbiology of sugar mill cooling towers and spray ponds; potential for Legionella control	Jul 98–Oct 02	Ms Christine Galea	\$4,020
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Project	Title	Duration	Contact	Funds 2002–03
Strategy C8 <i>Quality requirements of customers</i>				
Continuing Projects				
BSS192	Refinability of Australian raw sugars in terms of colour removal	Jul 97–Jul 02	Dr Michael O’Shea	\$4,576
Strategy C9 <i>Cane impacts on sugar quality</i>				
Continuing Projects				
BSS164	Identification of primary phenotypic traits that determine polysaccharide gum potential	Jul 96–Nov 02	Dr Mike Cox	\$8,244
CTA034	Predicting the incidence and magnitude of polysaccharide impurities and identifying the causal field-factors	Jul 98–Aug 03	Dr Graham Bonnett	\$85,187
UQ035	Molecular ecological studies on the formation of polysaccharide impurities in raw sugar	Jul 99–Dec 02	Dr Lindsay Sly	\$28,679
Strategy C12 <i>Core competency</i>				
Continuing Projects				
BSS254C	Support for core competence in strategic activities conducted by BSES (System C)	Jul 01–Jun 04	Mr Eoin Wallis	\$450,000
SRI111	Improved materials for reducing factory maintenance costs	Jul 01–Jun 04	Dr Gaye Davy	\$10,000
SRI112	Modified long life roll shell surface for eliminating roll arcing and extending roll shell life	Jul 01–Jun 04	Dr Gaye Davy	\$10,255
SRI113	Visual and tactile descriptors for scale identification	Jul 01–Jan 03	Dr William Doherty	\$13,838
SRI114	Drying of high pol sugars	Jul 01–Jun 03	Mr Rod Steindl	\$21,824
Total for System C				\$1,480,003

Project	Title	Duration	Contact	Funds 2002–03
System D	Industry Development			
Strategy D1	<i>Core competency</i>			
<i>Continuing Projects</i>				
BSS254	Support for core competence in strategic activities conducted by BSES (System D)	Jul 01–Jun 04	Mr Eoin Wallis	\$252,000
STU043	D Rackemann — Enhanced batch pan design through application of computational models	Jul 01–May 04	Dr Jong Leng Liow	\$24,000
Strategy D2	<i>Scholarships</i>			
<i>Continuing Projects</i>				
STU027	N Bower — Functional genomics of sugarcane	Mar 99–Jan 03	Dr John Manners	\$4,833
STU028	S McCarthy — Automatic control of topper height	Feb 99–Jan 03	Prof John Billingsley	\$3,625
STU031	H Fengdou — Improved selection systems and data analysis for sugarcane breeding	Jan 02–Apr 05	Prof Kaye Basford	\$24,000
STU032	K Nutt — Proteinase inhibitors from canegrubs	Jul 00–Oct 03	Dr Terry Walsh	\$29,000
STU033	D Ward — Strategic baiting protocols for rodents in sugarcane	Feb 00–Jan 04	Dr John Wilson	\$29,000
STU037	C Brosnan — Expression modulating sequences for preventing transgene silencing in genetically-engineered sugarcane	Apr 01–Jul 04	Dr Bernie Carroll	\$29,000
STU038	N Flint — Sublethal and long term effects of poor water quality on freshwater and estuarine fishes	Jan 01–Apr 04	Prof Richard Pearson	\$29,000
STU039	E Meier — The availability of nitrogen in GCTB soils in the wet tropics and its impact on productivity and profitability	Mar 01–Jul 04	Dr Malcolm Wegener	\$6,750
STU041	C Ngo — Molecular analysis of suckering and tillering in sugarcane	Jun 02–Jul 05	Dr Christine Beveridge	\$29,000

Project	Title	Duration	Contact	Funds 2002–03
STU042	K Ritter — An investigation of the genetic, biochemical and molecular basis of sugar accumulation in sugarcane	Mar 02–Jul 05	Dr Ian Godwin	\$29,000
STU044	M Constantin (Hons 02) Commercial-in-Confidence	Feb 02–Jan 03	Dr Bernie Carroll	\$3,000
STU045	K Greenwood (Hons 02) A web-based siding allocation system	Feb 02–Jan 03	Mr Arthur Pinkney	\$0

New Projects

STU046	New Honours 2003	Feb 03–Jan 04		\$6,000
STU047	New Honours 2003	Feb 03–Jan 04		\$6,000
STU048	New Postgraduate 2003	Jan 03–Jul 06		\$14,500
STU049	New Postgraduate 2003	Jan 03–Jul 06		\$14,500

Strategy D3 *Travel*

New Projects

BSS259	Travel to the 12th Australasian Plant Breeding Conference	Jul 02–Sep 02	Mr Allan Rattey	\$3,415
CPI004	Travel to the Plant and Animal Genome Conference	Jul 02–Jan 03	Dr Karen Aitken	\$4,950
CSE002	Travel to 17th World Congress of Soil Science	Jul 02–Nov 02	Ms Elizabeth Meier	\$1,920

Strategy D4 *Leadership and human capacity development*

Continuing Projects

ARP001	Australian Rural Leadership Program	Jul 92–Sep 03	Mr John Quantrill	\$20,000
DHC001	Innovating and Developing Human Capacity in Rural Industries (joint RDC program)	Jul 01–Jul 06	Dr Roslyn Prinsley	\$20,000

Total for System D **\$583,493**

Grand Total all Systems **\$6,598,418**

ATTACHMENT B

ORGANISATIONAL IDENTIFIERS IN PROJECT CODES

Project Codes Organisation

ARP	Australian Rural Leadership Program
BSS	Bureau of Sugar Experiment Stations
CLW	CSIRO Land and Water
CPI	CSIRO Plant Industry
CSE	CSIRO Sustainable Ecosystems
CSR	CSR Ltd
CRC	Cooperative Research Centre for Sustainable Sugar Production
CTA	CSIRO Tropical Agriculture
DHC	Rural R&D Corporations Developing Human Capacity Program
DPI	Queensland Department of Primary Industries
ICB	International Consortium of Sugarcane Biotechnology
JCU	James Cook University
NA	New South Wales Agriculture
NISN	National Irrigation Science Network
NSC	New South Wales Sugar Milling Cooperative Ltd.
OHS	Rural R&D Corporations Farm Health & Safety Program
SAI	South Australian Research and Development Institute
SRI	Sugar Research Institute
STU	SRDC Student Scholarships
UQ	The University of Queensland
US	The University of Sydney
YDV	Yield Decline Joint Venture

ATTACHMENT C

ABBREVIATIONS AND ACRONYMS

ACFA	Australian Cane Farmers' Association
ACGC	Australian Cane Growers' Council
AFFA	Department of Agriculture, Fisheries & Forestry Australia
AIMS	Australian Institute of Marine Science
AOP	Annual Operational Plan
ASMC	Australian Sugar Milling Council
BSES	Bureau of Sugar Experiment Stations
CAC Act	Commonwealth Authorities and Companies Act 1997
CCS	Commercial Cane Sugar
CP2002	Cross-Program: Accelerated Enhancement of Productivity and Profitability for the Australian Sugar Industry
CRC	Cooperative Research Centre
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DPI	Queensland Department of Primary Industries
EM	Extraneous Matter
ESD	Ecologically Sustainable Development
GBRMPA	Great Barrier Reef Marine Park Authority
GxE	Genotype by Environment
IPM	Integrated Pest Management
ISSCT	International Society of Sugar Cane Technologists
JCU	James Cook University
LWA	Land and Water Australia
PIERD Act	Primary Industries and Energy Research and Development Act 1989
QSL	Queensland Sugar Limited
R&D	Research and Development
RDC	Research and Development Corporations
SRDC	Sugar Research and Development Corporation
SRI	Sugar Research Institute
UQ	The University of Queensland