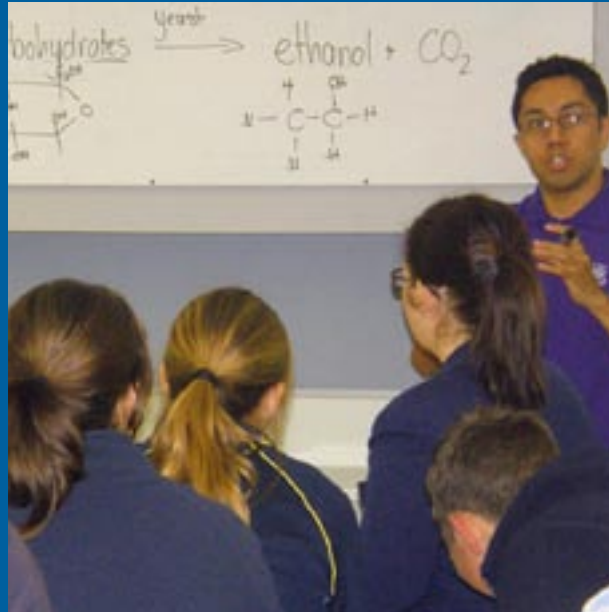


# PROGRAM 3

## Education



Increased industry and community awareness of available biotechnology opportunities and allied business and technical opportunities supports industry growth

## OVERVIEW

The third program in the CRC portfolio is education, designed to enhance the biotechnology and business skills of promising young researchers as well as increase industry and public awareness of biotechnology opportunities.

It is mainly administered through The University of Queensland and involves regular interaction with CRC researchers and students, and industry representatives. These interactions mean that research achievements are shared appropriately with CRC participants and the public.

The first and most important program aim is to educate and train undergraduate and postgraduate students in skills that will add product value to agricultural export industries. Our activities here are tailored to produce CRC SIIB graduates who are familiar with relevant technologies and industry and community perspectives and who understand new and emerging biotechnology industry priorities.

The second aim is to increase industry awareness of available biotechnology opportunities and allied business and technical skills.

This is accomplished through the CRC's partners in government, industry and academia, by

integrating teaching and training at undergraduate, postgraduate and in-service levels in agricultural biotechnology. The educative focus is on building intellectual capital in biotechnology so new products can be generated from sugarcane beyond the CRC's life. Community communication is the key to developing informed public understanding and knowledge about beneficial new technologies.

### TERTIARY EDUCATION AND INDUSTRY INTERACTIONS

Education and training of students, industry and the community are vital CRC SIIB activities. Through close links to sugarcane research groups such as BSES Limited and through a strong communication program, CRC SIIB education strives to keep industry and the public informed about recent sugarcane research and its industry applications.

### 2008>09 HIGHLIGHTS

- Three PhD and four Honours students successfully submitted their theses in 2008>09. A total of 41 PhD, Masters and Honours students have worked with the CRC SIIB since 2003.

- The CRC student training is already being recognised to the extent that six recently completed highly skilled graduates have been offered employment in a university or industry organisation.
- Five UQ undergraduates completed the summer Vacation Research Internship scheme and trained for six weeks in a CRC research laboratory or glasshouse.
- Education staff participated in the ARC Linkage project 'Research and Innovation Leaders for Industry'.
- A specialised professional development course in scientific writing for CRC postgraduates and early career researchers was held in February 2009.
- The 'Negotiating for authorship' workshop, developed in 2007 around CRC's trademark authororder<sup>®</sup>, was successfully run during The University of Queensland's graduate student week and Staff Development Courses in late 2008 and early 2009.
- The fifth CRC SIIB Research Symposium was held in Brisbane.

# PROGRAM 3

## CONTINUED

- Education staff participated in and gave seminars at major sugarcane industry events to raise awareness of the CRC SIIB's research and biotechnology. Two CRC students presented research posters at the 2009 Australian Society of Sugar Cane Technologists conference in Ballina, QLD.
- CRC students co-authored 20 publications from 1 July 2008 to 30 June 2009, including one provisional patent and eight refereed articles.
- CRC SIIB and the ARC Centre of Excellence in Integrative Legume Research (CILR) teamed in July 2008 to run the annual Plant Biotechnology for Beginners workshop in UQ's Biological and Chemical Sciences Faculty Experience Science Week. About 100 high school students and two teachers from South-East QLD and Northern NSW participated in the workshop to learn about various aspects of plant biotechnology related to the CRC and CILR.

To update the sugarcane industry about biotechnology, sugar biotechnology research and commercial and market aspects of GM crops here and overseas, the CRC organised and ran five regional meetings with the Sugarcane Gene Technology Group (SGTG) in early 2009. Participants included 79 sugarcane industry representatives. The workshops were held in

Murwillumbah (NSW), Bundaberg, Mackay, Townsville and Mulgrave (near Cairns).

Presentations were made at each workshop by Peter Twine (CEO CRC SIIB), Warren Males, Darren Schliebs, Bernard Milford or Jim Crane (on behalf of the SGTG), Graham Bonnett or Anne Rae (CRC – sugarcane biotechnology), Paula Fitzgerald (Agrifood Awareness), Phil Jackson, Karen Aitken, Scott Hermann or Mike Cox (CRC – the sugarcane breeding program), and Tom Schwartz (Beet Sugar Development Foundation, USA).

A networking dinner at each meeting allowed participants to discuss new aspects of the technology. The meetings provided a valuable forum for information and issue exchange between industry groups and sugarcane industry researchers. An email list of participants from the 2008 and 2009 meetings has allowed the CRC to maintain relationships and send relevant information on sugar biotechnology.

### EVALUATING SCHOOL EDUCATION

The long-term aim of this project is to work with, educate and train students in schools and the community about sugarcane biotechnology.

This year the CRC developed comprehensive educational resources for teaching middle and

senior students about complex issues and concepts related to biotechnology. Teaching strategies, classroom resources and data collection strategies and instruments were trialled and refined. Teaching and learning resources now include a digital resource toolkit, experimental inquiry activities and support strategies for teaching about biomaterials. A web page of resources and inquiry module with teaching support strategies helped students explore the issue 'Should Australia grow GM crops?'. Preliminary student data show a trend to better scientific literacy and knowledge about biotechnology in the middle years.

Teachers in target schools have been involved with researchers in implementing and refining the learning material.

The opportunity for Australian science teachers to learn more about the project was extended through the Conference of the Science Teachers Association of Queensland (CONSTAQ), UQ Emerging Technologies and Conference of the Science Teachers Association of Australia (CONASTA) teacher workshops in 2009 where teachers helped design and implement teaching strategies and materials.

Data from two PhD student projects indicate that the CRC's biotechnology modules increased student knowledge of biotechnology and scientific literacy. No change in the scientific literacy of

# PROGRAM 3 CONTINUED

parents was observed, however. The biotechnology modules taught increased middle school student awareness of biotechnology, with more instances of higher order thinking recorded after the modules were introduced. Senior chemistry students' knowledge of the potential benefits and capacity of biotechnology research to yield valuable biomaterials also significantly increased. Other findings indicate that using digital technology changes students' adverse ideas about biotechnology and can improve student learning outcomes from inquiry-based learning.

Another PhD student's work reveals that teachers' knowledge of biotechnology, lab skills and confidence to add components of biotechnology to their curriculum improves after collaborating with scientists. A teacher gains more understanding about the science if the collaboration takes place in the scientist's workplace.

