Australian Government
Cotton Research and Development Corporation

FINAL REPORT 2014

For Public Release

Part 1 - Summary Details

Please use your TAB key to complete Parts 1 & 2.

CRDC Project Number: **CGA UT1301**

Project Title: Cotton Industry Young Professionals Program

Project Commencement Date: 01/01/2013 **Project Completion Date:** 24/12/2014

CRDC Research Program: 4 People

Part 2 – Contact Details

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Signature of Research Provider Representative:

Date Submitted: 12/05/15

Prof Clive Baldock
Dean of SET (acting)

Part 3 – Final Report

Background

1. Outline the background to the project.

The Australian cotton industry is recognised as a primary industry leader in terms of innovation and uptake of new technologies. This success is largely attributable to the innovative professionals that work in the industry and investment in R&D aligned to industry needs.

Industry downturn due to drought, low commodity prices and competition from industries such as mining, means the industry must continue to acquire highly skilled professionals to support constant adaptation to change. Partnering with the Primary Industry Centre for Science Education (PICSE) has been a key strategy for the cotton industry to ensure it has access to, and availability of, skilled professionals in the future.

Professor Jim Pratley, representing Deans of Agriculture, reported in 2011 that approximately 700 undergraduates were being produced annually to meet a demand for over 4,000. PICSE's integrated program is well researched, tested and has been evaluated over 13-years, producing annually over 156 students seeking careers to help meet this demand. The PICSE program outcomes are further supported by research indicating the significant value of building long term relationships that change attitudes and perceptions amongst students, teachers, industry and the broader community about specific careers.

PICSE is an industry/university/school partnership designed to stimulate student interest in studying science at university and creating a pathway into real primary industries careers. PICSE brings together Government, RDCs, CRCs and industry investors, and has a national coordination centre hosted by the University of Tasmania (UTAS). Regional Activity Centres (ACs) hosted by universities and industries nationwide implement the PICSE program. Each AC has at least one Science Education Officer (SEO); a science teacher who is responsible for running PICSE activities for that centre.

This project supports direct engagement of students with employers so they can experience real professional cotton industry careers in action, and thus supports a stronger employee supply chain.

Objectives

2. List the project objectives and the extent to which these have been achieved.

a. Integrate the cotton industry program planning with the PICSE Framework

In 2013 Kay Lembo was appointed as a 0.5 FTE SEO for the Cotton AC with line management through the National Office. Kay's appointment, along with her other role of PICSE National Manager: Delivery and Quality Assurance, assured the cotton industry of strong AC management and a focus on innovation.

In February 2014 Carissa Anderson was appointed the PICSE SEO at 0.75 FTE, taking over this role from Kay. Kay continued to support the AC in a high level strategic role, overseeing the running of the centre and liaising with industry, universities and others involved in the Cotton Workforce Strategy. CSIRO provided much in kind support through Trudy Staines, who was integral in the delivery of activities for the Cotton AC.

The PICSE model is a well-established program, based on a series of proven activities and events that are rolled out throughout the PICSE calendar year. In addition to this, the PICSE

Program Manager was strongly engaged in CRDC cotton innovation activity, through the Workforce Development Project and PICSE has delivered outcomes that complement this initiative.

b. Students engaged with the cotton industry and students

A total of 17 schools were visited in 2014, with 53 classes addressed:

- Year 10 – 17 classes, 119 students
- Year 11 – 8 classes, 114 students
- Other – 28 classes, 506 students

This resulted in 739 students hearing the PICSE/Cotton message.

Schools visited were:

- Calrossy Anglican School
- St Philomena's School
- Warialda High School
- Dalby State High School
- Pittsworth High School
- Warwick State High School
- Wee Waa High School
- McCarthy Catholic College
- Assumption College
- Lockyer District High School
- Beaudesert State High School
- Narrabri High School
- Narrabri Public School
- Wee Waa High School
- FairFax Public school
- Wee Waa Public School
- Charles Sturt University

The Science and Engineering Investigation Awards (SEIAs) were held in August 2014. 151 entries from Narrabri High School, Narrabri Public School, Wee Waa High School, FairFax Public school and Charles Sturt University were received.

A breakdown of numbers for all school visits and SEIA entries is shown as Appendix 1.

The Cotton Industry Placement Camp was held at the University of Southern Queensland (USQ) in December 2014. 22 students attended and the evaluation is attached as Appendix 2. It was a joint camp with the PICSE USQ Activity Centre who had 10 students participate.

22 students will participate in Industry Placement Scholarships (IPSs) for the 2014 program. Organisations involved include IPS, CSIRO, NSW DPI and Auscott Ltd.

Industries involved in the Internship program include CSIRO, NSW DPI (Narrabri, Tamworth, Brisbane), Aquatec Consulting, Landmark, Elders, Delta Agri business, Cotton Grower Services, Auscott Ltd, Charles Sturt University, Cotton Growers and Consultants. A total of 12 students will complete these internships.

Statistics for previous years have been included in submitted Progress Reports.

c. Teachers engaged with the cotton industry

The Teacher Professional Development (PD) was held in June 2014. There is strong ongoing evidence that as a result of being involved with PICSE, particularly the PD activity, teachers increase their understanding of primary industries and potential career pathways for students. Year on year, teachers have said that their thinking and motivation in teaching science has been impacted and that they are better able to advise students about career opportunities in science based industries. Feedback has been very positive about the PD experience with teachers calling it excellent, well organised, engaging and useful. There is a sustained belief that PICSE resources positively contribute to the science curriculum with activities/resources which can be used in the classroom/laboratory/field.

d. Annual reporting to cotton investors

Gordon Stone, Kay Lembo, Trudy Staines and Carissa Anderson attended the National Cotton Conference in August 2014. Kay Lembo provided the "E-summary: Cotton Industry Professionals: The Next Generation" attached as Appendix 3.

Gordon, Kay, Trudy, Sharon Downes and Ian Taylor met during the conference to discuss the PICSE Cotton Activity Centre moving forward.

SEO forums were held in Canberra in March 2014 and Adelaide in October 2014. These forums provided an opportunity for reviewing evaluation reports, forward planning, innovation and sharing Cotton Industry specific information, as well as that pertaining to other agribusinesses and RDCs. Carissa Anderson presented twice at these forums and Trudy Staines once on Cotton specific activities and events.

e. Increase the size of engagement from half AC to full AC

Carissa Anderson (previous PICSE SEO from UNE) was appointed as the Cotton SEO at 0.75 FTE and commenced February 2014, taking over the role from Kay Lembo, who continued to be actively involved in an in-kind supervisory role.

The intention was for Carissa Anderson to increase to 1.0 FTE and the centre to become a full AC in 2015.

f. Increased employer engagement and buy-in

Increased buy-in is related to links with the Workforce Development Strategy. A cotton agribusiness pilot project was proposed in mid to late 2014 which PICSE would be an integral element of. As the cotton agribusiness links strengthen greater buy-in is expected. The pilot is currently running to engage agribusiness with undergraduate students. As mentioned above, the PICSE Internship model is used to place students with agribusiness.

g. Stronger engagement with Investing in Youth / CRDC

Strong links with RIRDC and the Horizons Scholarship students continued to be forged and maintained, with a number of PICSE students gaining success in receiving scholarships. Students were encouraged to apply for the scholarships and assistance was given in organising placements. RIRDC presented at the SEO Forum in March 2014 regarding the Horizons Scholarships.

Methods

3. Detail the methodology and justify the methodology used. Include any discoveries in methods that may benefit other related research.

PICSE has an established operational framework that consists of:

- SEO – responsible for developing strong relationships with students, teachers and employers while managing all elements of the program;
- Annual PD courses for science teachers – illustrating the connection between science taught in class and the science applied in local primary industries/R&D;
- Delivery of IPSs for Year 11/12 science students – including science/industry camps and industry placements to demonstrate real cotton career opportunities;
- Production of teaching resources – using cotton industry exemplars that integrates into school science curricula; and
- A robust, monitoring, evaluation and reporting process – that demonstrates return on investment against project objectives.

This system has been used in the cotton industry since 2009, with the SEO, increasing from a 0.3 FTE to a 0.75 FTE. It was proposed that this would be increased to a 1.0 FTE during 2015. This proposal was based on anticipated increased cotton employer buy-in and engagement during both the schools program and an early university mentoring process that was introduced.

The project has been delivered in the cotton industry through:

- A centrally located cotton industry funded SEO (Kay Lembo and then Carissa Anderson - both experienced science teachers);
- Trudy Staines as an in-kind SEO funded by CSIRO;
- Class visits to address Year 10, 11 & 12 science students – providing examples of science applications in the cotton industry to illustrate the science and careers available;
- Science Investigation Awards (SIAs) and then SEIAs for primary and middle schools. The SEOs have worked with classes, assisting students to plan and complete their chosen investigations using the Scientific Method. The final was judged by community judges, and an awards session held afterwards to celebrate the students' work;
- Student IPSs (not work experience) within cotton industry organisations, including researchers and agribusinesses, via handpicked employers;
- Two-day PD programs for Year 11/12 science teachers, where the unique annual national theme was focused on the issues relevant to cotton;
- Production, distribution and use of cotton-specific teaching resources, using cotton industry exemplars, in targeted secondary schools in the cotton region, distributed to all PISCE ACs;
- Communicating the benefits and opportunities in PICSE with all stakeholders of the cotton industry and other industries;
- Partnering with agribusiness and industry partners in this process – including employers offering scholarships, holiday work, etc;
- Six monthly SEO national forums for reviewing evaluation reports, forward planning, innovation and sharing cotton industry information;
- SEO role in mentoring PICSE cotton students in early university years; and

- Engagement with the CRDC / RIRDC Investing in Youth program.

Outcomes

4. Describe how the project's outputs will contribute to the planned outcomes identified in the project application. Describe the planned outcomes achieved to date.

Industry's capacity to undertake R&D work, provide extension, education and advisory work, deliver industry support services and the technical management of key innovations, all underpins industry growth, the ability to adopt innovations, and then adapt to new settings to meet future needs. Cotton farming itself is an increasingly skilled discipline. These services all support industry in maintaining a sustainable competitive advantage. These advantages are all based on enhancing industry capacity to innovate – and delivery of these services is directly linked to the availability/dedication of skilled, intelligent and suitable people.

This project has directly addressed the development of human resources and increasing cotton industry capacity by creating a long-term supply chain of personnel to undertake these tasks in the future. For example, it is understood that approximately half the cotton industry's on-farm productivity gains are based on the application of cotton production sciences. In the face of a known aging professional workforce, the future availability of committed personnel to work across industry's R&D effort and service delivery is a significant industry limitation.

The investment has assisted in improving human resource development in the cotton industry by creating and sustaining a supply chain of science graduates to meet the cotton industry's future human capacity at a research and wider industry and employer level. A crucial element of the project has been to increase the strategic engagement of the cotton services sector so they take stronger ownership of the need to attract, mentor and retain bright young people in the cotton industry. This needs to be reflected in greater ownership of the problem and strategic contribution to the solution. Notable outcomes over the course of this project are:

2013 Outcomes:

- 'Cotton field to fabric' presentation at SEO forum October 2013;
- Reporting at Cotton Collective Forum on 7th August and Cotton Agribusiness Roundtable on 8th August 2013;
- Teacher PD held on the 9th and 10th December 2013 - 20 teachers in attendance;
- Teacher internship placement occurred at end of January 2014;
- The first student internship commenced on Monday 16th October with ACRI, Narrabri hosting an undergraduate for 5 days;
- 5 student undergraduate internship placements offered over December 2013/January & February 2014;
- 14 cotton students attended the industry camp, combining with USQ students on the 2nd – 6th December 2013;
- Open partnership communication established with Cotton Australia (Sophie Davidson), Trudy Staines (CSIRO/ACRI) and Kay Lembo (PICSE);
- Science & Engineering Investigation Awards (SEIAs) held in August 2013 at Narrabri;
- National Teacher Resource included cotton entomology career information. Released in February 2014; and

- Cotton Workshop 'Cottoning-on to Primary Industries Contexts in the Classroom was delivered at CONASTA 62 July 2013 in Melbourne.

2014 Outcomes

- 'Cotton Field to Fabric/Mini Gin presentations at SEO Forum March 2014;
- Teacher PD held on 25th and 26th June 2014;
- 2 of the 5 Cotton supported Horizon Scholarship students were PICSE students - Grace Scott and Alana Martin. The following comment is noted from the Horizon Scholarship Coordinator "Grace comes from Castle Hill in NSW and was by far one of the strongest applicants this year";
- The undergraduate student internships were completed by Johanna Nielsen and Stirling Robertson. Johanna was hosted by ACRI, Narrabri for 5 days and Stirling was hosted by Namoi Cotton, Aquatech Consulting, Cotton Seed Distributors, Narrabri;
- Science & Engineering Investigation Awards (SEIAs) were held in August 2014, with 73 entries from schools visited by the SEO;
- National Teacher Resource was released in early 2014, including cotton entomology career information;
- Cotton camp held at USQ in December 2014 with 22 students in attendance;
- 22 IPS participants selected to complete placements under the 2014 program; and
- 12 undergraduate internships to be completed under the 2014 program.

5. Please describe any:-

a) technical advances achieved (eg commercially significant developments, patents applied for or granted licenses, etc.);

NA

b) other information developed from research (eg discoveries in methodology, equipment design, etc.); and

NA

c) required changes to the Intellectual Property register.

None

Conclusion

6. Provide an assessment of the likely impact of the results and conclusions of the research project for the cotton industry. What are the take home messages?

Despite the changing circumstances impacting on the program leadership, funding arrangements and ACs, the key messages remain the same - students, teachers and judges enjoy being involved in the PICSE program and believe it has positively impacted their broader awareness and understanding of science, primary industries and associated career paths. Students indicate that involvement (particularly the IPS camp) has influenced their future study plans and career choices. Teachers said that it has been valuable and helped them

teach science better (PD program). Judges (SEIAs) believe that students are more positively engaged with science and inspired to pursue their area of interest.

The enhanced PICSE integrated activity model represented good value for investors and partners, as participants continued to provide solid evidence of its impact on their perception of the breadth and depth of career pathways available within agriculture and science. The project shared a breadth of primary industry 'stories to tell' across the nation by way of the PICSE SEOs presenting to secondary science students and teachers, and undergraduate students. It also produced and distributed teaching resources (online and hardcopy) made available for use by teachers nationally, with a strong cotton industry focus. Through the enhanced links with a wide variety of industry partners, it ensured students and teachers were exposed to a variety of cutting edge R&D technologies. This reinforced the concept of how new technologies can be linked to profitable production and demonstrated the value chain from production into a product.

This project actively engaged with high quality young people during school years and early university, to make them aware of current industry research being undertaken by the cotton industry, of related tertiary science courses and the opportunities of professional careers in primary industries. The program also strengthened networks within schools, universities and industry organisations through collaboration and ensured that current, relevant and novel information was disseminated to the broader community increasing the understanding of Australia's cotton industry at local and national levels

This project has shown that students and teachers report that through active participation with industry and research organisations, they develop a greater understanding of contemporary science being undertaking, career paths available and the relevance to Australia's wider Primary Industry sector.

Impact on increased understanding of workforce needs and student career pathway opportunities by teachers:

There is strong ongoing evidence that as a result of being involved with PICSE, particularly the PD activity, teachers increase their understanding of primary industries and potential career pathways for students. Year on year, teachers have said that their thinking and motivation in teaching science has been impacted and that they are better able to advise students about career opportunities in science based industries. Feedback has been very positive about the PD experience with teachers calling it excellent, well organised, engaging and useful. There is a sustained belief that PICSE resources positively contribute to the science curriculum with activities/resources which can be used in the classroom/laboratory/field.

Impact on the development of a deeper understanding of the value of science courses and their relevance to the contemporary workforce by students:

Over the last three years, PICSE has continued to deliver a range of experiences for students that reinforce the relevance of science and make it exciting. These key PICSE goals have been consistently met over the years with students participating in the SEIAs and IPS camps providing the same message; that as a result of being involved their understanding of, and interest in, science has increased - particularly within primary industries. A recurrent theme is that students are now more aware of the broad range of science applications and the capacity to open doors to diverse careers. There is evidence that primary school students' attitudes towards science are being impacted by their involvement in the SEIAs, which can logically be assumed to have a flow on effect to secondary and tertiary study options. Personal contact with industry representatives has been raised by students as one of the most beneficial aspects of the process.

Impact on attracting students into tertiary science and increasing the number of skilled professionals in science-based primary industries:

The last three years of collated data shows compelling evidence that the IPS program in particular is delivering innovative and experiential engagement opportunities to make science interesting and allow students to make informed choices for tertiary education. Unfortunately, tracking data is yet to be collated this year from ACs which means no hard conclusions can be made in this report about student follow through of intended study and career choices. There is clear ongoing evidence however that student attitudes towards science are changed as a result of the IPS camp.

Extension Opportunities

7. Detail a plan for the activities or other steps that may be taken:
(a) to further develop or to exploit the project technology.
(b) for the future presentation and dissemination of the project outcomes.
(c) for future research.

It is envisaged that the PICSE activities will be continued through a separate agreement between CRDC and the University of Southern Queensland.

The PICSE program's capacity to provide practical engagement of students and teachers with scientific researchers, industries and agribusinesses is paramount to its success. The capacity to allow students (secondary and tertiary) to experience 'first-hand' work integrated learnings assists them in making potential career changing decisions. The influence impacts on tertiary study options, refining their specialty area of studies and/or their desire to pursue further engagement with a particular industry. Equal benefit for the wider scientific and industry stakeholders exists through early identification and mentoring opportunities with skilled and dynamic individuals who may fulfil their future workforce capacity requirements.

For the cotton industry, ongoing funding, along with active scientific and industry engagement, must be maintained to actively attract a skilled research workforce to ensure national and international economic activity.

8.

A. List the publications arising from the research project and/or a publication plan. (NB: Where possible, please provide a copy of any publication/s)

NA

B. Have you developed any online resources and what is the website address?

PICSE online resources can be viewed at www.picse.net

Part 4 – Final Report Executive Summary

Evaluation reports consistently return the same key message - students, teachers and judges enjoy being involved in the PICSE program and believe it has positively impacted their broader awareness and understanding of science, primary industries and associated career paths. Students indicate that involvement has influenced their future study plans and career

choices. Teachers said that it has been valuable and helped them teach science better (PD program). Judges (SEIAs) believe that students are more positively engaged with science and inspired to pursue their area of interest.

The enhanced PICSE integrated activity model represented good value for investors and partners, as participants continued to provide solid evidence of its impact on their perception of the breadth and depth of career pathways available within agriculture and science. The project shared a breadth of primary industry 'stories to tell' across the nation by way of the PICSE SEOs presenting to secondary science students and teachers, and undergraduate students. It also produced and distributed teaching resources (online and hardcopy) made available for use by teachers nationally, with a strong cotton industry focus. Through the enhanced links with a wide variety of industry partners, it ensured students and teachers were exposed to a variety of cutting edge R&D technologies. This reinforced the concept of how new technologies can be linked to profitable production and demonstrated the value chain from production into a product.

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The last three years of collated data shows compelling evidence that the IPS program in particular is delivering innovative and experiential engagement opportunities to make science interesting and allow students to make informed choices for tertiary education. There is clear ongoing evidence that student attitudes towards science are changed as a result of the IPS camp.

Appendix 1

Cotton Class Visits & SEIA Entrants 2014

Record of Schools/Colleges/Events Visited in 2014 for ALL Activity Centres

				No. of Classes				No. of Students				
Name of School/College	Location	Date of Visit	Teacher/s Name	Other	Yr 10	Year 11	Year 12	Other	Yr 10	Year 11	Year 12	No of SEIA entrants
Calrossy Anglican School	Tamworth	24/07/2014	Bronv Nielson		1	1			8	10		
St Philomena's School	Moree	14/08/2014	Libby Smith		1				25			
Warialda High School	Warialda	15/08/2014	Nicole Simmons		1				20			
Dalby State High School	Dalby	15/09/2014	peter Donnan		1	1			18	20		
Pittsworth High School	Pittsworth	17/09/2014	Nancy Pattel			2				30		
Warwick State High School	Warwick	17/09/2014	Amanda Coy			1				15		
Wee Waa High School	Wee Waa		Sharon Greifman									
Narrabri High	Narrabri	24/07/2014	Emma Partridge									
McCarthy Catholic College	Tamworth		Leanne Spillema	2								
Assumption College	Warwick	30/10/2014	Lynne Lucic			1				20		
Lockyer District High School	Gatton	31/10/2014	Judy Schultz		1	1			6	2		
Beaudesert State High School	Beaudesert	31/10/2014	Hardy Manser			1				17		
Narrabri High School	Narrabri	July	Amy Johnson	1				21				21
		August	Michelle Charalambous		1				21			21
Narrabri Public School	Narrabri	July	Dianne Shann	18				439				18
		August										
Wee Waa High School	Wee Waa	July	Sharon Greifman	1				18				4
		August	Toni Stewart		1				21			4
Fairfax Public school	Maules creek Narrabri	October	Rebbecca Smith	5				10				4
Wee Waa Public School	Wee Waa	August	Anne Cain	1				18				1
Charles Sturt University	Wagga Wagga	August	non SEO visits		8							78
			Sub-total	28	17	8	0	504	119	114	0	151
			2014 TOTAL	**53**				**739**				**151**

Appendix 2

Cotton Centre IPS Camp Evaluation 2014

2014 Cotton Centre IPS Camp

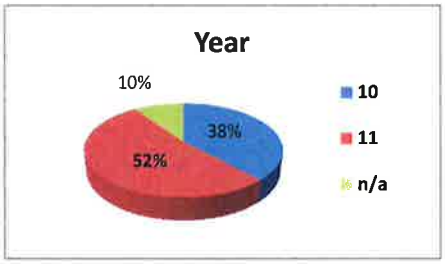
21 students participated, 21 respondents (100%)

Please note: respondents indicates the number of student who completed an evaluation form.

* n/a = no data

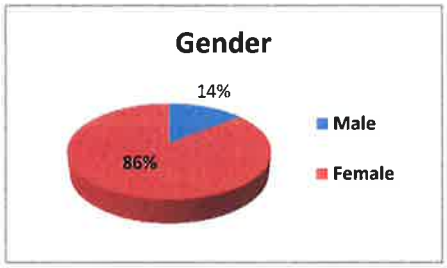
Year

10	11	n/a
38%	52%	10%



Gender

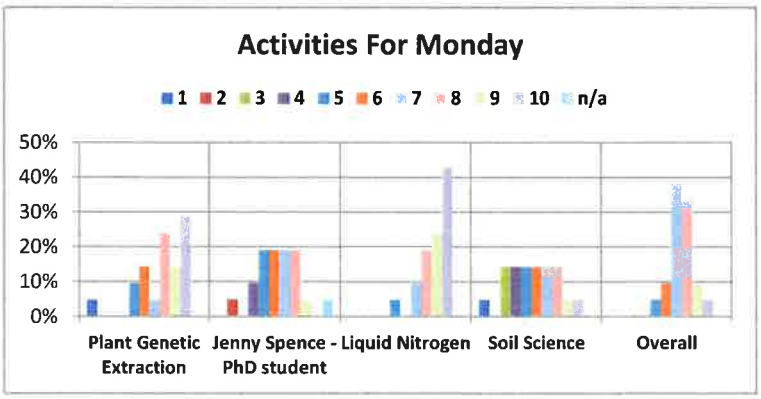
Male	Female
14%	86%



Q3. Monday

(10 = excellent)

	1	2	3	4	5	6	7	8	9	10	n/a
Plant Genetic Extraction	5%	0%	0%	0%	10%	14%	5%	24%	14%	29%	0%
Jenny Spence - PhD student	0%	5%	0%	10%	19%	19%	19%	19%	5%	0%	5%
Liquid Nitrogen	0%	0%	0%	0%	5%	0%	10%	19%	24%	43%	0%
Soil Science	5%	0%	14%	14%	14%	14%	14%	14%	5%	5%	0%
Overall	0%	0%	0%	0%	5%	10%	38%	33%	10%	5%	0%



best activity for the day

Liquid nitrogen X 11

Soil science

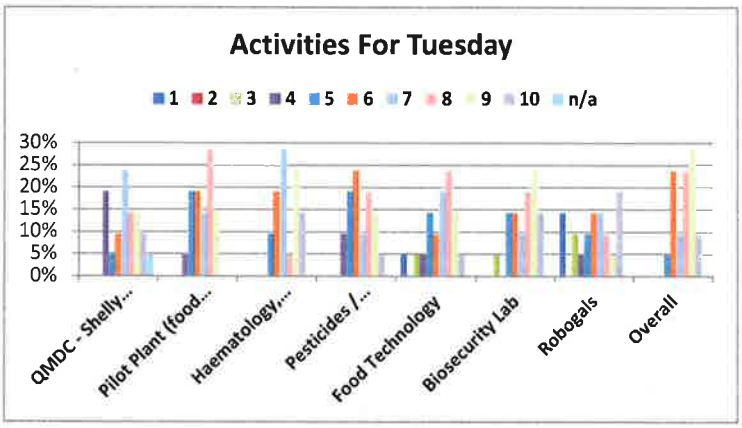
Plant genetic extraction X 5

Liquid nitrogen and plant genetic extraction

Q4. Tuesday

(10 = excellent)

	1	2	3	4	5	6	7	8	9	10	n/a
QMDC - Shelly Purser	0%	0%	0%	19%	5%	10%	24%	14%	14%	10%	5%
Pilot Plant (food tech)	0%	0%	0%	5%	19%	19%	14%	29%	14%	0%	0%
Haematology, Chemistry, Clinical Biochem	0%	0%	0%	0%	10%	19%	29%	5%	24%	14%	0%
Pesticides / Aflatoxins	0%	0%	0%	10%	19%	24%	10%	19%	14%	5%	0%
Food Technology	5%	0%	5%	5%	14%	10%	19%	24%	14%	5%	0%
Biosecurity Lab	0%	0%	5%	0%	14%	14%	10%	19%	24%	14%	0%
Robogals	14%	0%	10%	5%	10%	14%	14%	10%	5%	19%	0%
Overall	0%	0%	0%	0%	5%	24%	10%	24%	29%	10%	0%



best activity for the day

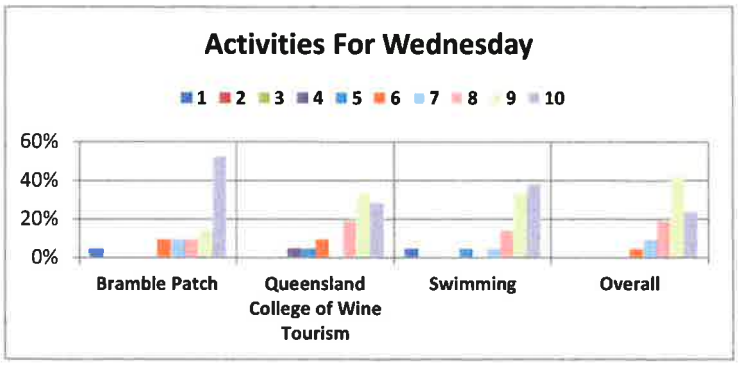
QMDC X 2
Food technology X 3
Haematology
Biosecurity Lab X 4
Biosecurity Lab / Food Technology
Pesticides / Aflatoxins
QMDC was really interesting
Pesticides / Aflatoxins
Biosecurity Lab / Clinical Biochemistry
Robogals X 3
Haematology, chemistry, clinical biology

Q5. Wednesday

(10 = excellent)

	1	2	3	4	5	6	7	8	9	10
Bramble Patch	5%	0%	0%	0%	0%	10%	10%	10%	14%	52%
Queensland College of Wine Tourism	0%	0%	0%	5%	5%	10%	0%	19%	33%	29%
Swimming	5%	0%	0%	0%	5%	0%	5%	14%	33%	38%
Overall	0%	0%	0%	0%	0%	5%	10%	19%	43%	24%

Q5. continued . . . . .



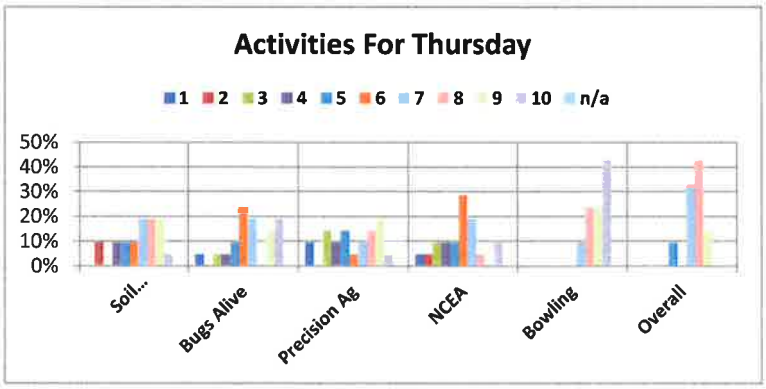
best activity for the day

Queensland college of wine tourism X 5
Swimming X 6
Bramble Patch X 5
Loved it all - especially pizza and wine chemistry
Wine Tourism
Bramble Patch / wine

Q6. Thursday

(10 = excellent)

	1	2	3	4	5	6	7	8	9	10	n/a
Soil Microbiology	0%	10%	0%	10%	10%	10%	19%	19%	19%	5%	0%
Bugs Alive	5%	0%	5%	5%	10%	24%	19%	0%	14%	19%	0%
Precision Ag	10%	0%	14%	10%	14%	5%	10%	14%	19%	5%	0%
NCEA	5%	5%	10%	10%	10%	29%	19%	5%	0%	10%	0%
Bowling	0%	0%	0%	0%	0%	0%	10%	24%	24%	43%	0%
Overall	0%	0%	0%	0%	10%	0%	33%	43%	14%	0%	0%



Q6. continued . . . . .

best activity for the day

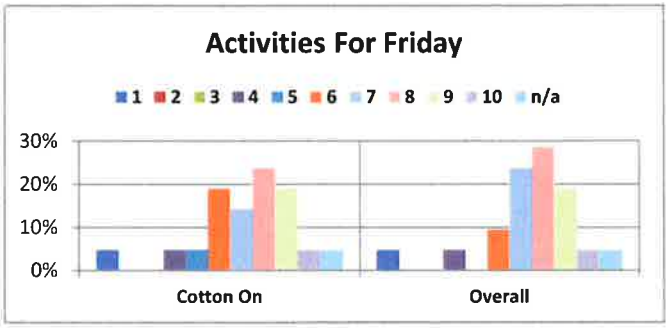
NCEA

Bowling X 8
Soil microbiology X 4
Precision Ag
Bugs alive and bowling X 2
Precision Ag
Bugs Alive X 2

Q7. Friday

(10 = excellent)

	1	2	3	4	5	6	7	8	9	10	n/a
Cotton On	5%	0%	0%	5%	5%	19%	14%	24%	19%	5%	5%
Overall	5%	0%	0%	5%	0%	10%	24%	29%	19%	5%	5%

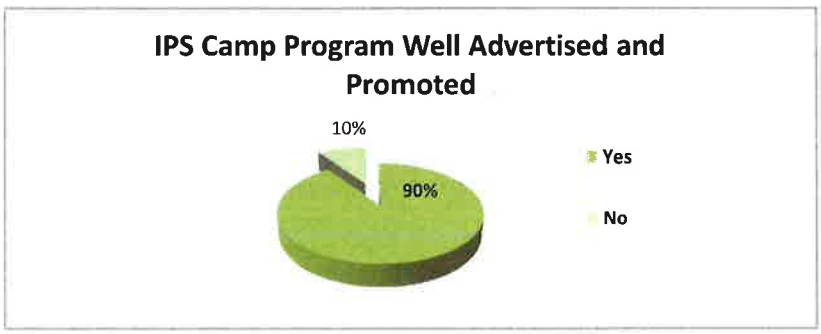


best activity for the day

Cotton On X 11
Cotton talk in lab
Cotton demonstration
Who would have thought - Cotton On
I don't know, all of it

Q8. Was the IPS Camp program well advertised and promoted?

Yes	No
90%	10%



Appendix 3

Kay Lembo E-Summary: Cotton Industry Professionals - The Next Generation

COTTON INDUSTRY PROFESSIONALS: THE NEXT GENERATION

AUTHOR **Kay Lembo**
ORGANISATION **Primary Industry Centre for Science Education**

17th australian COTTON conference
Our Fibre, Our Focus, Our Future

Prepared by CRDC on behalf of the 17th Australian Cotton Conference
www.australiancotton conference.com.au

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Australian Government
Cotton Research and Development Corporation

picse

Question/Issue Being Addressed

How can we enhance the supply of young professionals and researchers into the cotton industry? Through expansion of collaboration between the Cotton Research and Development Corporation (CRDC), agribusinesses and the Primary Industry Centre for Science Education (PICSE), 2013/2014 has seen the extended engagement and mentoring of students in their early stages of university studies. A Cotton Undergraduate Internship program has been developed to provide participants with a practical experience within a diverse range of Cotton industries, designed to align with individual areas of interest.

Key Results/Findings

The success of the '*Cotton Industry Young Professionals Program*', a partnership between PICSE and CRDC, highlighted the need to maintain contact with students once they embarked on their tertiary career. To maintain constructive and meaningful connection, a 5-day internship scholarship was designed and established to connect tertiary undergraduate students with industry scientists, university researchers and agribusiness organisations affiliated with the Australian cotton industry.

In the application process, students were asked to identify their enrolled tertiary course, year of study and indicate their top three preferred areas of interest. Identified areas of interest included: Soil Science; Legumes; Plant Agronomy; Plant Physiology & Pathology; Entomology; Semiochemicals; DNA & Elisa testing; Plant breeding; Nutrition; Agribusiness & Agricultural Engineering

Three students were selected to participate in trials, with their internships occurring between December 2013 and May 2014. On completion, students submitted written reports outlining the practical activities of their placement, as well as their opinions of the experience. All students identified that their knowledge of the industry increased, as well as identifying a specific influence on their tertiary study and career pathways and a desire to undertake more engagement with the cotton industry. Student comments included:

UG1: "The industry placement was really an eye opener and a huge motivation boost for me to achieve well at university and do more work placements."

UG3: "As a result I am now rearranging my enrolment pattern so I can study USQ's Microbiology courses as part of my biology major."

UG 2: "The week ..... gave me a solid direction to pursue throughout the rest of my studies. I'll now make better choices for myself when it comes to picking electives in my final year."

UG 1: "... was a great experience and ..... Not only did I gain an insight into how the cotton industry works and operates, but I also made some strong contacts with industry professionals."

UG 1: "Before I started..., my interests were with irrigation development as this was really all I imagined an agricultural engineer could do. However, after seeing the Greenstar in action, and the technology involved ..... my interests have really shifted towards precision agriculture."

UG 2: "After the internship, I realised how much career potential there is within the industry. ..... I am looking forward to becoming more involved within the industry and, through further experience and my 4th year engineering thesis."

Impact Benefits on Australian Cotton Industry

Allowing university undergraduates to experience first-hand the diversity of roles within the cotton industry, not only increase their awareness, it enables students to see real world applications of the often theoretical focus of their tertiary studies. Through active participation with the industry, students have the opportunity to foster industry contacts, investigate future workforce opportunities and make informed career decisions. This engagement assists cementing connections with tertiary students, potentially influencing areas of university study that could enhance research for the cotton industry, as well as facilitating personal connections with agribusinesses seeking personnel.