

Schooling our cotton industry in Australia: Sharing the knowledge

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ABSTRACT

The Australian Cotton Cooperative Research Centre (Cotton CRC) through its Education, Transfer and Adoption of Technology program has developed the only university level cotton production course in Australia. The cotton production course is offered at the undergraduate certificate and graduate certificate level and delivered through The University of New England mainly as an external (off campus) course of four units to cotton growers, professional consultants and agronomists, service industry personnel and industry extension officers. One cotton production unit is offered internally (on campus) to undergraduate students at three Australian Universities; The University of Queensland, The University of Sydney and the University of New England. External students attend a weeklong practical residential school within each unit at the Australian Cotton Research Institute near Narrabri in NSW. Each unit also includes assignments, examinations and online learning exercises. There is a strong emphasis on active adult learning styles for presentations. There are four units to the certificates: Unit 1; Cotton Production, covering irrigation, soils, nutrition, crop growth and development, farm design and fiber quality, Unit 2; Cotton Protection, covering pest, weed and disease management, Unit 3; Cotton and the Environment, covering on and off farm impacts on the environment and best management practices, and Unit 4; Cotton Farming Systems, covering communication skills, ginning classing and spinning, and risk management within the broader farming picture. Thirty external students per year enter the course (numbers are limited to maintain effective interactive teaching) who generally attend one unit per semester, completing the certificate or graduate certificate over a two year period. The course material is distributed as a comprehensive set of notes and is presented by speakers drawn from the research and industry personnel of these organizations. The cotton production course has received excellent reviews from the students and industry, winning Australian Federal Government recognition in 2001, via an excellence in business award, the BHERT (Business/Higher Education Round Table) award. Cotton Consultants Australia (CCA) recognise the course as a key component in a cotton consultant's experience and training. This paper presents the Cotton CRC Cotton Production Course as an effective and practical

method of technological transfer and training for the Australian Cotton Industry.

Introduction

Extension begins with a deliberate commitment to active education frameworks. Effective extension of new research ideas to those who might apply them has long been recognised as far more than simply publishing papers or making presentations. All participants in an industry, from researchers to cotton growers, their employees, and support industry staff, need to "speak the same language" and understand the scientific principles behind current and newly emerging practices. A farming analogy might liken new research ideas to seeds, and industry education to the fertility of the soil onto which those new research seeds are cast. That is, good ideas will be more readily received if they are well understood by all concerned. The Australian Cotton Cooperative Research Centre (Cotton CRC) through its education and extension program has put this approach into practice by developing, a progressive education program.

In conjunction with The University of New England (UNE) in Armidale NSW, the Cotton CRC has developed an undergraduate and graduate level certificate in Applied Cotton Production. This offers a recognized qualification, within the School of Rural Science and Agriculture at UNE, with the aim of providing graduates with the practical and scientific skills that promote efficient and sustainable cotton production in Australia. The course has been running for ten years (instigated in 1994) and is designed for people already in the cotton industry and those wishing to enter it.

This paper will outline the Cotton course subjects and method of delivery, and a comprehensive evaluation of the last four years the course has been running. We are pleased to report a high level of satisfaction amongst students and the cotton industry, particularly with regard to the content of the course and the opportunity for networking throughout other levels and regions of their industry.

Content and method of delivery

The Australian Government has developed research funding structures that include the formation of Cooperative Research Centres (CRC). These seek to achieve industry goals through the collaborative efforts of relevant government state departments, research organisations (CSIRO, universities and government agencies) and relevant commercial industry partners. The Australian Cotton CRC is composed of: The Commonwealth Scientific and Industrial Research Organisation (CSIRO), New South Wales Agriculture, Queensland Department of Primary Industries, Agriculture Western Australia, Northern Territory Department of Business, Industry and Resource Development, Uni-

versity of New England, University of Sydney, Cotton Seed Distributors, Twynam Farms, Queensland Cotton, Western Agricultural Industries and the Cotton Research and Development Corporation (CRDC). The Cotton CRC was designed to address a particular set of research goals of the Australian cotton industry. Such was the importance placed on education and extension within the Cotton CRC that a program was developed to directly address these issues. The education sector of this program forms the focus of this paper.

Four units make up the certificate or graduate certificate courses. The units are titled: Applied Cotton Production, Cotton Protection, Cotton and the Environment and Cotton Farming Systems. The subjects covered in each unit are displayed in Table 1. Two units are offered each semester, i.e. all four units are offered each year, but most external students choose to complete the course over a two year period, taking on one unit per semester. All courses include assignments, an examination, and a practical residential school at the Australian Cotton Research Institute. Students are also provided with internet and CD learning tools to encourage interaction and assist with learning the course material.

Education style

The education style follows an active adult education format. Presentations are designed to encourage discussion, debate or similar active involvement amongst students and presenters. Presenters are also encouraged to demonstrate the principles of their material in practical ways. All presenters are selected from amongst research and industry personnel so that practical and scientifically relevant attributes are emphasized. This ensures relevance and active use of the information.

A cotton course web site, available to enrolled students via the University (UNE) is used to distribute some assessment tasks such as revision quizzes, discussion topics and provide useful internet links for assignment topics. This has been particularly useful for widely distributed students to contact one another and search for resource material. The course has also produced a compact disc (CD) to present helpful learning tools, for example, animations for visualising plant development or even soil chemical processes and electronically searchable course notes.

Evaluation of the course by student surveys

The course was evaluated in 2002. Four years (1999 to 2002) of students were surveyed via the University of New England course evaluation scheme (conducted by Mr. Guy Roth). Roth (2002) coordinated and developed the cotton course for three years from 1999 to 2002 and the following summarizes the results of

this evaluation. The students' responses have been very positive, indicating a very successful extension of cotton production skills and research outcomes in all aspects reviewed (Roth, 2002).

Who does the Cotton Course?

For the education program to be effective the cotton certificate course needed to reach a broad cross-section of the industry personnel from all cotton growing regions of Australia. Table 2 indicates the occupations, and Table 3 the areas that students enrolled in the course were derived from. These two tables indicate a good general spread of occupations and cotton growing regions represented by the students in this course, reflecting the concentration of cotton activities in the various states.

Summary of the main outcomes of the survey

1. Graduates are located in every cotton growing area of Australia.
 2. 100% of students considered the course notes were useful and well organised and 93% have used the notes since completing the course.
 3. 100% considered the residential schools were productive and 98% believed that they should remain compulsory.
 4. 100% considered the workload was reasonable, the assessment weightings appropriate, and that assignment feedback was helpful. 98% said they found the course challenging.
 5. 100% believed that the course had helped with their work (78% strongly agreeing) and fulfils a valuable training role (93% strongly agreeing).
- (Source: Roth, 2002)

The overwhelming response is that students consider the CRC Cotton Course to be highly relevant, well delivered and vocationally valuable. Students repeatedly praised the opportunity to network with others in the industry. This is particularly true at the residential school where students from all of Australia's cotton growing regions travel to the Australian Cotton Research Institute in the Namoi Valley for a week of presentations and practical sessions. Information also filters to other industry participants via these students. Language and educational barriers between researchers, industry service groups and growers are broken down as the "code" used by presenters (researchers and industry experts) and industry staff blend in active learning sessions. This is not a one-way street. Growers and consultants make their concerns readily known to research staff. This two way, extension operates to maximize research priorities and industry understanding.

The education sector is strongly linked to the extension side of the Cotton CRC program. All industry development officers (Cotton CRC extension officers)

complete the certificate course to make sure that they have a broad understanding of the industry and the research supporting it. These officers then extend various aspects the information via field days, local area grower groups, and industry-based short courses.

Conclusion

The Australian Cotton CRC's Applied Cotton Production Course, delivered through the University of New England, has provided an effective education framework, which strongly supports the extension efforts within the Australian cotton industry. It has facilitated the development of a rich network of communication for well-founded information to flow to and from researchers, growers and consultants. This cotton course is an ex-

ample of how a formal framework of adult education can be a very effective and satisfying tool for overcoming many of the intrinsic barriers between research and application in an rapidly evolving agricultural industry.

References

- Roth, G.W. (2002). A Course Evaluation of the Post Graduate Certificate and Certificate in Rural Science (Cotton Production) (1999-2002). University of New England. Armidale.
- UNE 2003 Handbook, (2003). The University of New England Course Handbook. Certificate in Agriculture and Graduate Certificate in Rural Science (Cotton Production). University of New England, Armidale.

Table 1. Units and subjects covered in the Australian Cotton CRC/University of New England, Undergraduate Certificate and Graduate Certificate in Applied Cotton Production (source: UNE 2003 Handbook, 2003).

Cotton Production (1 st Semester)	Cotton Protection (2 nd Semester)
Introduction to the cotton industry	Insect identification and sampling
Cotton history and breeding	Insect ecology
Cotton development, growth and management	Insect management
Cotton nutrition	Introduction to weeds in cotton
Soils	Weed identification and assessment
Irrigation and farm design	Weed control in cotton
Post-crop processing	Weed case studies
Cotton price	Introduction to plant diseases
	Survival, dispersal and infection of pathogens
	Strategies in disease control
	Cotton disease case studies
Cotton and the Environment (1 st Semester)	Cotton Farming Systems (2 nd Semester)
Introduction to the environment	The farm as a purposeful system
Agricultural ecosystems	Farm case studies
Environmental impact assessment	Communications (Workshop)
Water conservation	Cotton marketing and spinning
Soil degradation processes and conservation mechanisms	Modelling and farming systems research
Salinity	
Flora, fauna and biodiversity	
Chemicals in cotton	
Legal issues	
Environmental management systems	
Pesticide use and application	

Table 2. The proportion of graduates of the Cotton CRC Applied cotton production course from typical cotton industry occupations. Derived from Roth, 2002.

Occupation	Graduates (%)
Agronomist	34
Chemical companies	10
Family farm	8
Corporate farm	8
Extension	8
Seed companies	8
Research	2
Teaching	2

Table 3. The cotton growing regions in Australia from which the undergraduate and graduate certificate students were based. Derived from Roth, 2002.

Cotton Growing Regions	Proportion of Graduates (%)
Gwydir Valley (Northern NSW)	22
Namoi Valley (Northern NSW)	22
Macquarie Valley (Northern NSW)	15
MacIntyre Valley (Northern NSW)	14
Darling Downs (South-eastern QLD)	13
St George (Southern QLD)	8
Lachlan Valley (Southern NSW)	3
Cunnamulla (Southern Queensland)	3