

Public Support for Science and Innovation Study

## ROLE OF THE COTTON CRC

The Australian Cotton CRC is highly regarded for its strength in technology transfer and education programs for industry. The CRC learning and adoption systems have been developed and continually improved to adapt to differing issues and target groups. Deploying modern extension methodologies and specialised staff has allowed the CRC to develop a highly effective extension and education network that is now one of Australia's leading rural extension models.

Recent research shows that cotton growers and consultants are experiential learners who actively seek information and experiences to develop their knowledge. Strategies are needed to aid experiential learning for assisting substantial changes in issues that cannot be easily "learnt by doing". Knowledge services are moving towards partnerships between growers, consultants, agribusiness, research and extension.

The role of crop science research is to generate new knowledge for use by farmers. However due to many challenges, including information overload, this knowledge is not always useful or used. Research highlights opportunities and partnerships to improve the uptake and use of research and industry learnings.

Research has identified that the cotton industry is responsive to change and willing to continually learn, with all sectors prepared to share information. The Cotton CRC's adoption strategies have contributed to innovation in industry that is considered to be on par with leading firms in business. Regular local testing and application of research from a trusted source such as the Cotton CRC has been identified as a critical part of this strategy.

**This submission contends that the CRC framework is an excellent model for collaborative R & D, delivering proven excellence in research, adoption, education, training, independence and integrity with industry partners.**

**The CRC framework leads to collaboration and synergies among research providers and with industry partner. Hence, duplication is avoided, with the benefit of the CRC's access to specialized skills and resources across State and industry boundaries.**

It is our contention that the CRC framework and investment by the Commonwealth (DEST) provides the glue, stimulates the synergistic benefits and accelerates innovation and adoption by a number of years, because it sees environment and communities as directly related to the industry's bottom line.



### Participants

. Australian Cotton Growers Research Association Inc. . Cotton Australia Ltd . Cotton Research and Development Corporation  
. Cotton Seed Distributors Ltd. CSIRO . NSW Department of Primary Industries  
. Queensland Department of Primary Industries and Fisheries . Department of Agriculture Western Australia  
. The University of New England . The University of New South Wales . The University of Sydney  
. University of Technology - Sydney

## Economic Benefit

An independent economic evaluation of the payoff of some programs of the Australian Cotton CRC investments was completed in March 2004 by the BDA Group, Melbourne. It found the outcomes were estimated to deliver benefits of \$586m to the Australian cotton industry. Accounting for price effects, 87 per cent of these benefits would be captured within Australia, or \$510m in total representing a net return of \$438m or **\$7 for every dollar invested**.

TABLE 2: SUMMARY OF ESTIMATED BENEFITS

Output Area	Industry Outcome	Benefits
<i>IPM</i>	1. Reduced pesticide use	\$250m
	2. Control of Whitefly	\$10m
	3. Delayed Resistance	\$53m
	4. Pesticides in water ways	\$2m
	5. Pesticide spray drift	-
<i>Weeds</i>	6. Adoption of Round up Ready <sup>®</sup> cotton	\$18m
<i>Diseases</i>	7. Fusarium Wilt	\$184m
	8. Export cotton seed market	\$4m
<i>Water</i>	9. Water use efficiency	\$64m
	10. Deep drainage	\$1m
<b>TOTAL <sup>a</sup></b>		<b>\$586m</b>

Note: Benefits reported in present value terms.

A full copy of this study is on [www.cotton.crc.org.au](http://www.cotton.crc.org.au).

### Participants

### Delivering the knowledge

The Year 5 review of the Cotton CRC was conducted in June 2004 by an Independent Review Panel comprising; Professor Daniel Kreig, International Cotton Specialist, Texas Tech University (Chair), Dr Michael Keller, Deputy Head of School of Agriculture (Entomologist) University of Adelaide, Mr Hamish Millar, Vice Chairman, Australian Cotton Growers Research Association and cotton grower, Dr John Williams, former Chief CSIRO Land and Water, and Professor Henry Nix (Centre Visitor). The review panel's Executive Summary reported;

*"This CRC has been extremely successful over the past five years as measured by a number of criteria. The reasons for the success include:*

- A. Intelligent, dedicated Research Scientists addressing real-world problems in a scientific manner.*
- B. A Technology Transfer Team that truly interacts with the Research Scientists to develop state-of-science programs for the Cotton Industry using a variety of delivery mechanisms.*
- C. The CRC has been effectively and efficiently managed using a relatively small administrative structure and a management committee that truly fosters collaborative research and extension efforts for the good of the Cotton Industry and the community at-large. It has truly developed a spirit of cooperation and collaboration among Industry, Government and University personnel that has no equal in the scientific world. No single agency could ever achieve the degree of success enjoyed by the CRC.*

*"Very importantly, the CRC benefits from serving an Industry that is well educated and eagerly seeking immediate, feasible solutions to their on-farm production problems as well as long-term solutions addressing sustainability of their environment for future generations. The industry demonstrated to us that they are not only totally supportive, but provide leadership and interact strongly with the research activities, and the technology transfer approaches used to deliver solutions to the major problems associated with cotton production in Australia. Therefore the CRC benefits from Industry through financial, political, and emotional support*

*"This CRC has been extremely successful in solving some of the most-pressing problems of the cotton industry and demonstrating both economic and environmental benefits to the producers they serve and to the community at-large. The success of the CRC is reflected in the exceptionally high levels of adoption of its innovative research developments and in the 7:1 financial returns on investment from its outputs. These accomplishments are truly "Crown Jewels" of which all in this CRC can be very proud."*



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**INTEGRATED PEST MANAGEMENT OF COTTON DELIVERS TRIPLE BOTTOM LINE OUCOME –**

**A Case Study by the Australian Cotton CRC.**

- A MAJOR FOCUS OF THE COTTON CRC PARTNERS HAS BEEN THE DEVELOPMENT OF INTEGRATED PEST MANAGEMENT SYSTEMS, KNOWN AS 'IPM'.

**Triple Bottom Line Outcome:**

- **ECONOMIC**- \$300 MILLION INDUSTRY BENEFITS FROM REDUCED PESTICIDE USE
- **ENVIRONMENTAL**- DRAMATIC REDUCTION IN PESTICDE LEVELS IN RIVER SYSTEMS OVER LAST 5 YEARS
- **SOCIAL** - LESS COMPLAINTS IN THE COMMUNITY ABOUT PESTICIDES



Integrated Pest Management of Cotton achieves major benefits.

- A SIGNIFICANT REDUCTION IN PESTICIDE USE HAS BEEN A MAJOR GOAL OF THE COTTON CRC
- INTEGRATED PEST MANAGEMENT (IPM) INVOLVES THE USE A WIDE RANGE OF TOOLS TO MANAGE PESTS RATHER THAN RELYING ON INSECTICIDES ALONE.

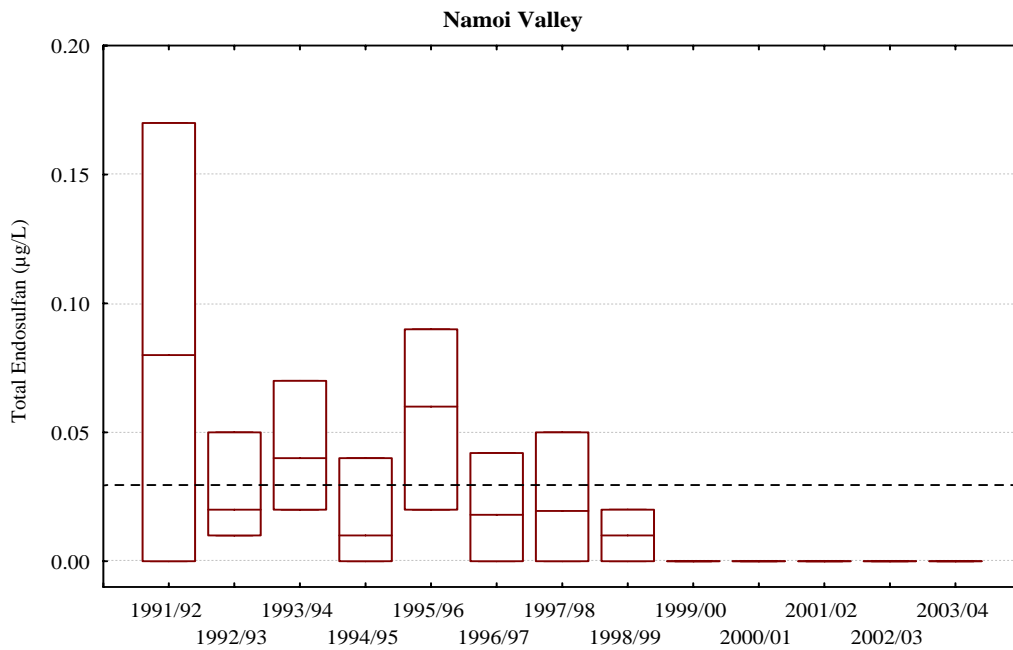
- SOME IPM METHODS INCLUDE; USING NATURAL BIOLOGICAL CONTROLS FOR INSECTS PESTS, SUCH AS PREDATORS (EG LADYBIRD) AND PARASITES (EG WASPS), DESTRUCTION OF OVERWINTERING HELIOTHIS PUPAE WITH TILLAGE, GROWING TRAP CROPS TO ATTRACT PESTS AWAY FROM COTTON AND GROWING TRANSGENIC COTTON TO HELPS TO CONTROL PESTS
- RESEARCH RESULTS AND MANAGEMENT STRATEGIES HAVE BEEN INCORPORATED INTO THE IPM GUIDELINES, WHICH PROVIDE COTTON GROWERS AND CONSULTANTS WITH DETAILED INFORMATION ON HOW TO GO ABOUT IMPLEMENTING INTEGRATED PEST MANAGEMENT ON THEIR FARM
- THE BENEFIT OF INTEGRATED PEST MANAGEMENT ADOPTION BY THE COTTON INDUSTRY HAS BEEN:IMPROVED ECONOMIC RETURNS WITH LESS CHEMICAL USE.
  - **THE NET INDUSTRY BENEFIT** FROM INTEGRATED PEST MANAGEMENT (IPM) WAS RECENTLY ESTIMATED AT **\$300M** IN PRESENT VALUE TERMS.
  - A SIGNIFICANT REDUCTION IN CONTAMINATION OF THE ENVIRONMENT FROM SYNTHETIC PESTICIDES HAS BEEN A MAJOR OUTCOME.
  - **THE PERCENTAGE OF SAMPLE DETECTIONS OF ENDOLSULFAN ACROSS SITES IN THE NAMOI, GWYDIR AND MACINTYRE RIVERS HAS DECREASED FROM AROUND 45% 5 YEARS AGO TO LESS THAN 1% IN 2003/04, WHICH IS BELOW THE WATER QUALITY GUIDLINE TRIGGER FOR 99% ECOSYSTEM PROTECTION**
  - **PESTICIDE USE FOR CONVENTIONAL COTTON HAS FALLEN FROM AROUND 8 KILOGRAMS OF ACTIVE INGREDIENTS PER HECTARE IN 1998/99 TO UNDER 2 KILOGRAMS OF ACTIVE INGREDIENTS PER HECTARE IN 2002/03**
  - PESTICIDE USE FOR TRANSGENIC COTTON FELL FROM AROUND 6 KILOGRAMS OF ACTIVE INGREDIENTS PER HECTARE IN 1998/89 TO LESS THAN 1 KILOGRAM OF ACTIVE INGREDIENTS PER HECTARE IN 2002/03.
- THE COTTON CRC'S SUCCESS IN EDUCATION AND TECHNOLOGY TRANSFER HAS BEEN A MAJOR CONTRIBUTOR TO THESE OUTCOMES, ESTABLISHING A UNIQUE SINGLE GATEWAY TO AND FROM THE INDUSTRY, WITH THE FREE FLOW OF INFORMATION CASCADING THROUGH THE INDUSTRY.
- THESE BENEFITS HAVE BEEN DUE TO A COMBINATION OF INTEGRATED PEST MANAGEMENT STRATEGIES DEVELOPED THROUGH RESEARCH, THE USE OF TRANSGENIC COTTON AND THE IMPLEMENTATION OF THE COTTON INDUSTRY'S BEST MANAGEMENT PRACTICES (BMP) ENVIRONMENTAL MANAGEMENT SYSTEM.



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Reduction in pesticide levels in rivers - Environmental Outcome

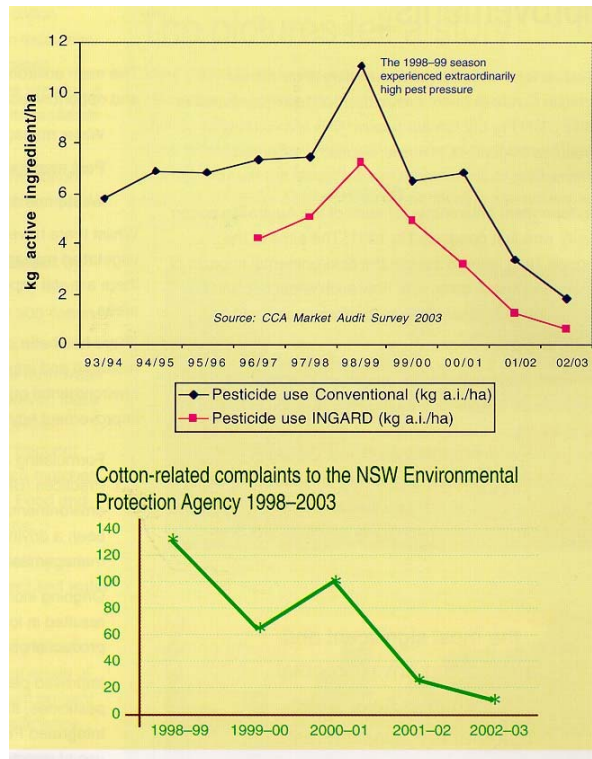


**Figure 2: Box plots of total endosulfan results for the Namoi Valley (irrigated cotton area data only) from 1991/92 to 2003/04.** Each box represents the middle 50% of the data collected for each year. The middle line in each box represents the median (or 50<sup>th</sup> percentile) value, which is the most useful when assessing water quality data. The broken line represents the Australian and New Zealand water quality guideline trigger value (ANZECC and ARMCANZ 2000) for 99% ecosystem protection (0.03 µg/L) (Source NSW DNR 2005.)



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**Figure 3:** Reduction in cotton pesticide use (Source CCA 2003) and cotton related complaints to the NSW EPA

