

EXECUTIVE SUMMARY

Knowledge is fundamental to improving the competitiveness, responsiveness and levels of innovation that we see in industries. This research project aimed to determine how information and knowledge about water management and water use efficiency is being used and managed in irrigated cotton and grains and the key factors influencing decision making. To do this, 90 interviews of growers of cotton and grains, consultants, extension workers, government researcher officers, and irrigation equipment suppliers were conducted and a stakeholder workshop held to integrate and progress the findings.

Key issues affecting water management

The project found that four issues in particular were currently impacting on water management:

1. The availability, continued security and cost of water;
2. Economic returns per mega litre;
3. Water quality;
4. Water scheduling.

Growers of cotton and grains accepted that water would be a more restricted resource for them in the future. Crop consultants believed that water management had now emerged as a major focus in their work with growers. Giving advice to growers about water use and efficiency will be an increasingly large part of consultants' work with growers.

Cropping Systems

The majority of growers interviewed produced cotton and grains and some also had other crops or livestock. Most were clearly transferring the knowledge used in their cotton crop to managing other crops. A few of the growers interviewed irrigated only grain crops. There were generally strong similarities between all of these growers as well as a few clear differences.

Growers made decisions about which crop to grow primarily on the basis of the returns per megalitre. Cotton was currently the most profitable irrigated crop for most growers interviewed. However, they indicated that each season they weighed up the benefits and value of other crops and would readily shift to another if it were more profitable.

Information, knowledge and knowledge sharing

All groups believed that the cotton industry was responsive to change, willing to continually learn, and that growers, consultants and extension officers were very willing to share information and knowledge. There was considerable information that was available to cotton growers and consultants. A major concern, however, among growers and consultants, was the need for the information to have been tested and applied to determine its relevance and applicability to specific regions.

Major sources of information

Cotton growers were accessing a large number of people and resources in making decisions about water management. The major “people” sources were:

- consultants
- researchers
- other growers
- own experience.

The major “resources” they talked about were:

- trial data
- field days
- *Cotton Tales*
- grower experiences
- case studies.

Growers preferred personal contact to gain information about water management. Growers accessed this range of people and resources over a number of seasons in thinking through major changes to water use and management. Consultants were the major source of information, and provided a close working relationship that could also bring into the growers’ decision-making a variety of other information from research, trials and the consultant’s experiences with other farmers in their region.

Grain-only irrigators were similar in terms of the people, resources and activities that influenced their decisions. The main difference was that these growers didn't have a regular consultant, relying more on their own, extensive experience, family, farm staff and water regulators for information. Grain only irrigators didn't express as great or as urgent a need for more information about irrigation as did cotton growers. They were less aware of what information and resources were available to them and what was available was seen to be 'a bit hit and miss'. Field days were less frequent though they would like to see more.

Consultants generally sourced information in very similar ways to how growers did, but were able to make more use of accessing information from other consultants, especially those in their own companies. In addition, they made more explicit attempts to directly resource research and the views of researchers.

What influences decisions?

The **water reform** process is playing a major role in shaping the context within which growers and consultants are making their current and future decisions about irrigated crops. Growers report that they are realistic and expect some form of cutbacks in water availability. However, they would like to see some reduction in the current levels of uncertainty about water security.

Own experience was a prime factor in decision-making and most growers and consultants actively tried out new ideas. This has contributed to incremental improvements in water management. It was felt by some extension staff that many of the gains that could be made through incremental change had already been achieved (eg furrow optimisation). Significant future improvements may require substantial changes (eg systems change) that cannot be easily learnt through on-farm experimentation by growers.

The **driving forces** for positive actions to improve water efficiency are:

- evidence from in-house and outside trials,
- cut backs in water availability,
- the introduction of soil water monitoring devices,
- the continued need to gain maximum financial returns per mega litre of water, and
- access to knowledgeable and supportive consultants and agronomists.

New ideas in water management have been looked at for some time but it was not until forces like those above had emerged, as well as the recent drought, that growers began to re-think their attitudes about water management practices.

The **barriers** for growers to changing water management practices are:

- the lack of practical evidence that the changes will actually work on their farms, and
- the financial and labour costs of introducing new technologies and farming practices.

Role of public and private service providers

Growers and consultants had similar perceptions, but with some differences in their emphasis. Growers described the public providers' (research and extension) role as being about identifying growers' needs, and to get research completed and communicated back to growers to address their needs about irrigated crops and related issues. Consultants spoke more about the role being limited to having research commissioned and communicated back to the industry, with the implication that the consultant's role was more about identifying growers' needs than it was for the public provider. Consultants believed that they played a more hands-on role or day-to-day role in working with the grower to decide and to implement the crop and water management strategies for the season. At the same time, growers expected to see a cooperative relationship between consultants and extension. In general, growers and consultants felt that there was a lot of cooperation though the sharing of materials and knowledge between research and extension providers and consultants.

Research, development and extension needs

Growers, consultants and suppliers identified a long list of issues that they felt required more in-depth research. Common to their lists were water scheduling, production and efficiency figures for different irrigation systems, salinity management, loss of water research and waterlogging.

Interim Recommendations from the Research

Given this understanding of knowledge management, we put forward for consideration the following recommendations:

- 1. Ensure that information about water management is available through a variety of avenues.** Develop and support a package of a range of information and learning mechanisms to suit the differing needs and interests of stakeholders. This package would include field days, newsletters, information resources, website, trials, computerised decision support models, training courses, for example.
- 2. Continue to promote as a major strategy the one-to-one interaction and personal contact between irrigators, consultants, suppliers and extension workers.** Irrigators want practical, matter-of-fact information gained through personal contact. They learn by doing and seeing. The best face-to-face methods to promote access to new information and to promote knowledge sharing are field days, trials and grower groups. Access to the experiences of other irrigators and consultants are especially valued as a part of both of these initiatives.
- 3. Undertake and promote regional research.** Irrigators want more information relevant to their particular set of farming conditions (i.e. soil type, location, climate). They want more crop trials, field trials and growers groups in their own districts, and write-ups of local case studies providing practical, accessible information relevant to their particular conditions. Therefore, more effort needs to be taken in research being trialled across different types of districts, and the outcomes of these trials being promoted through field days and short, practical publications like *Cotton Tales*. These need to draw together the water delivery and agronomic aspects of water management.
- 4. Provide detailed, practical training in irrigation measurement and management for consultants.** Private consultants need to be better educated about irrigation management. While expert in pest management, many consultants believe that they lack the required levels of irrigation management knowledge to best assist growers. Identified experts (e.g. expert private consultants in whole-of-farm water efficiency management, successful

irrigation farmers from various states and regions) need to be brought into all regions to train private consultants, extension officers and others in the numerous aspects of more effective water and irrigation management.

5. **The public sector role and expertise needs to continue to be centred upon providing, in highly accessible formats, the findings of relevant research supplemented with practical examples of the local application of this research.** Extension staff are perceived by irrigators, consultants and others as facilitators or “knowledge-brokers” who provide information that demonstrates best practice and technical support. They need to continue to promote this role, including greater efforts to promote information to private consultants who are the key individuals influencing irrigators’ decisions about water management.
6. **Research needs to be targeted to meet growers’ needs.** It is proposed that a **grower review board** be established in major regions to identify key areas for research, and secondly, to discuss with researchers at regular forums the practicalities of actually implementing the findings from their research. This body would assure that research that is required for specific regions is undertaken. Also this body needs to work with extension so that research findings are communicated in ways that maximise the likelihood of uptake by growers and consultants in particular. This role may be a local adaptation of the ACGRA function.
7. **Given their central role as a key source of information gathering and knowledge generation and sharing, consultants need to be better targeted in extension activities.** A cooperative approach to information transfer is the best option, and one that is very possible given the existing positive relations between consultants and extension in most valleys.
8. **Continue to send out short, concise, practical information to growers through *Cotton Tales* in particular.** Include links to more detailed, useful information. Where possible, *Cotton Tales* should be modified by local extension officers to promote information of the most relevance to their particular region and those growers’ needs. Similar formats would be useful for grain

irrigators, although more work is needed in understanding their needs.

9. **More work is needed into identifying potential vehicles for cross-industry cooperation** in the area of sharing information and knowledge about water management, including forums devoted to innovative water management strategies, and greater incorporation of lessons from other industries into *Cotton Tales*, COTTONpaks and other information resources given to growers.
10. **There needs to be the development of more “one-stop” integrative information tools**, such as for example, CD’s that combine all of the information from different sources on water management (WATERpak is currently under development); a searchable database of all trials (including trial books); field days that only focus on one or two issues in-depth; and a catalogue of “who is doing what” in research.
11. **Continue and increase the offerings of courses** such as the Cotton CRC’s/UNE’s Cotton Production course and the GRDC’s/UNE’s Sustainable Grain Productions course, and ensure a sufficient focus upon irrigation management.
12. **Regularly prepare and place articles about more effective water management for specific regions** in *Cotton Tales*, the *Cotton Grower & Graingrower* magazines and *Country Life/The Land* and promote these to growers and consultants as a resource for irrigation information.
13. **Identify or appoint extension staff willing and able to develop greater technical and general expertise in water and irrigation management** to be available to all key stakeholder groups, and most specifically, growers and consultants.
14. **Investigate the potential and scope for an Irrigation Technology Resource Centre**, and determine whether this Centre could service all irrigation sectors nationally.

Integration and Planning

Key stakeholders met to consider the recommendations of the research and to progress a way forward. There was great diversity between the different industry sectors in which of these recommendations they considered to be of highest priority. This highlighted the need for any knowledge system for cotton and grain irrigation to incorporate a range of avenues for information and learning. These components can be defined as:

1. Developing grower experience;
2. Upskilling advisors in irrigation management – consultants, irrigation suppliers and extension;
3. Generating and communicating localised data through field trials, action research, field days and case studies;
4. Providing ready access to relevant information;
5. Facilitating collaboration and knowledge sharing across industries and between public and private sectors; and
6. Undertaking research to enhance the irrigation knowledge base.

Recommendations

Based on the discussions with key stakeholders at the workshops and through the steering committee, three recommendations are made:

1) A collaborative irrigation knowledge system be developed that incorporates an integrated package of delivery mechanisms:

- Training – growers, consultants and other advisers.
- Accreditation pathway for consultants in irrigation management.
- Case Studies of grower's efficient practices and improvements.
- Information resources – web and print with well maintained distribution pathways.
- Media and newsletters.
- On-farm trials – facilitate linkages, provide trial protocols and communicate.
- Regional extension activities – groups, field days, information delivery, trials.
- Cross-industry forums and study tours.

It is recommended that this be developed as a pilot program for cotton and grain irrigation industries as a collaboration between the cotton, grains and irrigation industries and related research agencies.

2) It is recommended that a series of specific research projects be commissioned to investigate further various key aspects of irrigation management that are identified in this report. These projects respond to the information and knowledge needs of key stakeholder groups. The specific topics are detailed in various sections of this report. In addition, future research might benefit from the use of other research methods to investigate knowledge management and related issues. Again, such methods are identified in the body of this report.

3) Develop strategies to assist irrigators in overcoming the barriers to change that have been identified in this study. This includes utilising novel means to develop grower experience for improvements that require substantive rather than incremental change.

