

Australian Cotton Cooperative Research Centre IPM short courses – an industry learning together

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ABSTRACT

Integrated Pest Management (IPM) is a crop protection system that best meets the requirements of sustainable development and is currently being adopted in a range of agricultural systems worldwide including the Australian cotton industry. IPM is about using a number of tactics to manage pests in a way that ensures the sustainability of the Australian cotton industry and is by its very nature a complex and continuously evolving pest management philosophy. Implementing IPM is a challenge; it is not a simple solution but can lead to long term, cost effective, sustainable pest management. A subjective attitudinal evaluation of the adoption of IPM using a focus group approach to gauge the understanding of the issues impacting on the adoption of IPM technologies and strategies conducted within the Australian cotton industry in 1997, recommended the development of a comprehensive educational package clarifying the latest best practice for IPM. The Cotton Research and development Corporation (CRDC) and the Australian Cotton Cooperative Research Centre (Australian Cotton CRC or Cotton CRC) immediately provided funding for the IPM Training Coordinator project to develop, in consultation with industry and researchers, a grower focused training short course in IPM. An important feature of the project is the continuous involvement of industry researchers, extension staff and IPM practitioners in collaborative development of the IPM short course. The concept of 'learning together' is reflected in the contribution of knowledge, experience and a real world practical approach to gaining knowledge that course participants bring to the IPM short course. The IPM short courses are directed primarily at cotton growers and farm managers (decision-makers) with the objective of training a large proportion of growers in a relatively short period of time. Cotton production and IPM are yearlong activities. The IPM short course program is designed to be sympathetic with the annual production cycle. An 'extended learning program' over a period of approximately 12 months will allow learning activities to be conducted throughout the cropping season and a review of progress towards nominated goals at the end. The IPM short course moves through three phases consisting of a two-day formal pre-season session, a series of two in-season field days and a review/evaluation post-season session to conclude the short course pro-

gram. The IPM short course is now proceeding throughout the cotton growing regions of Australia. Growers benefit by developing a clear understanding of IPM and how it can be implemented. The knowledge of what has been achieved by those participating in the training will encourage further innovation and adoption. The IPM short course provides a forum for discussion that helps growers develop solutions to real problems as well as challenging current industry thinking on pest management.

Introduction

Integrated Pest Management (IPM) is a crop protection system which best meets the requirements of sustainable development and sustainable agriculture currently being adopted in a range of agricultural systems worldwide including the Australian cotton industry. IPM by its very nature is a complex and continuously evolving pest management philosophy. In the Australian cotton industry, IPM has been defined as 'a system that integrates all means of managing pest populations with the aim of reducing insecticide use while maintaining profitability, yield, fiber quality and crop maturity'. IPM therefore, is about using a number of tactics to manage pests in a way that ensures the sustainability of the Australian cotton industry. Implementing IPM is a challenge; it is not a simple solution but can lead to long term, cost effective pest management.

The concept is based on many years of scientific research and development and the accumulation of hard-earned experience. Most growers practice some elements of IPM. For example, the use of pest thresholds and insecticide resistance management strategies are important components of IPM. Financial, environmental and regulatory pressures are threatening the sustainability of the industry. To expand the adoption of IPM and improve sustainability, growers need to acquire a deeper understanding of all available tactics to control insect pests.

Why the IPM training short course?

IPM is a complex dynamic system requiring a change in attitudes to pest management. Knowledge, understanding and confidence are needed for IPM to be successfully adopted.

The third year review of the Cooperative Research Centre for Sustainable Cotton Production recommended investigating the development of a short course to improve technology transfer. During 1997 the Rural Extension Centre (REC) and Cotton Extension Team conducted a subjective attitudinal evaluation of the adoption of IPM within the Australian cotton industry utilising

a focus group approach. The purpose of the study was to increase the understanding of the issues impacting on the adoption of IPM technologies and strategies in the Australian cotton industry. Focus groups permitted exploration of the social, economic and technical aspects of IPM as raised at the time by growers (Coutts, 1997).

Key issues that emerged from the study in 1997 included:

- There was a positive environment for the acceptance and adoption of IPM strategies in the industry;
- There was a lack of clarity about current best-practice IPM strategies;
- Economic issues remain the chief determinants of management strategies and yields remained the primary indicator for a successful crop.

Methods

On the recommendation of Coutts' (1997) report, the Cotton Research & Development Corporation (CRDC) and Australian Cotton CRC provided funding for the IPM Training Coordinator position whose role is to develop, in consultation with industry and researchers, a grower focused training short course in IPM. The IPM training program aims to develop:

- A comprehensive educational package, which clarifies the latest best practice for IPM as identified by industry experts (including growers);
- Economic links to IPM strategies, with the assistance of Australian Cotton CRC economists, within short, medium and longer-term timeframes;
- An extension program (including grower best practice groups) assisting growers to 'take responsibility' for management decisions.

An important feature of the project is the involvement of industry researchers, extension staff and IPM practitioners in collaborative development of the IPM training short course.

The concept of 'learning together' or participatory learning is reflected in the contribution of knowledge and experience by course participants, and a real world practical approach to gaining knowledge about IPM. Inherent in this approach is the flexibility and capacity to change as we learn from new technology and experience, enabling us to manage constantly evolving demands. In addressing the complexity of IPM, the course reinforces an active, adaptive approach to decision making so that participants don't adopt a recipe approach to pest management.

The overall aim of the short course is to improve the understanding and increase the adoption of IPM strategies by cotton growers. Dissemination of knowledge through education and training is a vital part of adoption of IPM by cotton growers. There are many

links in the chain, from the scientist developing IPM tools and management strategies to growers and pest control operators practising it. Some form of education and/or training is usually required at each step of the chain.

Traditionally, Australian cotton growers have removed themselves from making decisions on insect pest management and concentrated on other farm/crop management issues. They have relied extensively on the advice of contracted consultants for pest management. To improve the adoption of IPM it was recognised that growers need to be actively involved in the pest management.

To achieve this, the following key components were identified:

- The need for IPM training of technical and teaching staff;
- Training of government and private extension staff, distributors and retailers is an important link with a direct influence on individual growers;
- Development of education and training programs specifically targeting growers.

For the training program to work, it needs to convince growers and others trying to manage pests, that IPM is relevant to their local circumstances and that it will bring them easily identifiable benefits. A range of knowledge and practical skills which will provide growers with the opportunity to gain such benefits from IPM have been identified. These include:

- Recognition of pests, beneficials and their uses;
- Understanding plant growth and crop responses to damage;
- Keeping initial infestation pressures low using every opportunity (e.g. optimised cropping system and sowing dates);
- Selecting the most suitable cultivars to grow;
- Assessing the importance of different pest populations and crop damage;
- Monitoring resistance;
- Product knowledge – pests controlled, effects on beneficials;
- Selecting IPM products; with emphasis on efficacy to the target pest, user and environmental safety, specificity on the target pest, and impact on resistance management;
- Deciding when to apply an IPM product;
- Identifying where IPM products are needed; and if treatments can be localised;
- Equipment calibration;
- Risk assessment and safety precautions.

The success of IPM is not only dependent on the management of a pest population on an individual field or farm. To move beyond individual field management, growers need to understand how pest control strategies can be deployed on a 'area wide' or regional basis.

Course development

To ensure that the course meet the demands of growers a critical step was to establish a Cotton Industry Reference Group (CIRG). This group includes growers (8), consultants (2), Industry Development (extension) Officers (2), and representatives from Cotton Research and Development Corporation (1) and the Cotton CRC (3). The group's aim was to development of the aims and objectives of the IPM training short course as follows:

- Develop and implement a nationally accredited short course in IPM for the Australian cotton industry;
- Develop a comprehensive grower focused IPM reference manual for the Australian cotton industry;
- Co-ordinate the implementation and ongoing development of an IPM short course for the Australian cotton industry;
- Have 70% of all Australian cotton growers attend the IPM short course by June 2005;
- Work with industry researchers and extension staff to improve the transfer of information to growers and consultants;
- Assist in the training of regional Industry Development Officers (IDOs) in IPM strategies.

The reference group meets periodically to monitor and review project progress and advance the development of the IPM Training Short Course Reference Manual and Workbook. The project team utilised this group for an early 'pilot' of the course in order to obtain feedback for further development of the instructional aspects of the course.

Who are the IPM training short courses for?

The IPM training short courses are directed primarily at cotton growers and farm managers (decision-makers) with the objective of training a large proportion of growers in a relatively short period of time. The program provides an understanding of the principles of IPM and the knowledge and confidence to provide leadership and direction to the adoption/implementation of IPM strategies for a sustainable future (Kauter *et al*, 2000). Thus consultants with a clear knowledge of grower expectations are able to use their expertise in the development of appropriate tactics in pest management. It is also considered that area-wide grower groups will provide an ideal base for the delivery of the course and create a support network for IPM growers.

There is a broad range of other potential course participants including consultants and corporate agronomists, chemical manufacturer and distributor representatives, and spray contractors and applicators. Tailored workshops can also target consultants and their staff although it is anticipated that many consultants

may choose to opt for the more formal academic course offered through the Australian Cotton CRC and the University of New England.

National training accreditation

It has been determined by the cotton industry that the IPM training short course embrace national competency standards. The learning outcomes for the training have been developed by the industry and reflect the needs of the industry with reference to IPM. The learning outcomes have been mapped against the existing National Competency Standards for cotton production. To facilitate national recognition and accreditation, assessment instruments have been developed and incorporated in the training program. Successful completion of the assessment will therefore enable the award of a nationally recognised certificate in agriculture.

Accreditation and national recognition ensures that the short courses qualify for funding subsidies such as FarmBi\$, a government funding scheme for rural training programs, and provides an advantage to growers seeking recognition in other training programs such as BMP, FarmCare, etc.

Course structure

The program consists of a two-day formal session and a series of field days for which participants receive a comprehensive reference manual, a course workbook and a package of industry publications related to insect management.

The IPM Manual provides participants with a starting point for discussion of each aspect of IPM and is a significant resource for growers after completion of the course.

The course workbook is an activity and response based learning guide that acts as an assessment benchmark for those participating in the workshops.

Workshops and field days will utilise the manual, workbook which form the basis of the group learning activities. The use of OHT, PowerPoint presentations and other audio visual aids assist the learning process of workshop delivery. The Integrated Pest Management Guidelines for Australian Cotton are a key reference publication used by growers during the workshops.

Participants manual

Research (including mapping existing industry publications) and writing of the IPM training manual for the IPM training short course occurred throughout 2001. The Manual currently consists of 10 chapters in three broad sections. IPM training manual chapters were reviewed and edited by the respective researchers of the Australian Cotton CRC. The contents and

learning outcomes for each chapter are outlined below:

IPM Training Short Course Reference Manual - Contents

1. **Understanding IPM** - Defining the elements and understanding the importance of IPM.
2. **Resistance and IPM** - Describing the development, impact and management of insecticide resistance.
3. **Planning, Communication and Recording for IPM** - Plan and implement short and long term insect and mite control strategies.
4. **Economics of IPM** - Describe the importance of in the economics of IPM.
5. **Know your Cotton Pest** - Identify and understand the life cycle of the major pests of cotton.
6. **Know your Cotton Beneficials** - Identify and understand the life cycle of the major predators and parasites of cotton pests
7. **Know your Cotton Plant** - Describe and monitor the development of the cotton plant.
8. **Crop Management and IPM** - List and describe the impact of cultural aspects of cotton production on pest management.
9. **Pesticide Selection and IPM** - Determine chemicals and biological agents for pest control.
10. **Implementing IPM** - Implement an integrated pest management program.

Assessment workbook

Assessment for the course is based on a workbook that contains exercises that when completed will satisfy the learning outcomes for each section of the course. An important component of the workbook will be grower case studies of various aspects of IPM.

The short course

Cotton production is an annual activity and the course program is sympathetic with the production cycle. An 'extended learning program' over a period of approximately 12 months provides learning activities and opportunities throughout the cropping season and a review of progress towards nominated goals. This structure gives participants the opportunity to meet, discuss and reflect on pest management options at length throughout the short course program.

The IPM short course progresses through three phases: pre-season, in-season and post-season as shown in Table 1. The pre-season workshop prior to the commencement of the season is designed to develop the fundamentals of IPM, review research and practical experience of IPM. The two in-crop meetings aim to put the theory into practice. Finally a review meeting after picking acts as a debrief and evaluation session by looking at how participants managed and apply what they learnt to their plans for the future.

The IPM training short courses are designed to incorporate ongoing review and evaluation. The Australian cotton industry and the practice of IPM are both

dynamic systems, which adapts and makes sensible use of the latest research, technology, advice and experience. It is therefore essential to ensure that the short course remains relevant, current and focused.

One potential risk that has been identified is the willingness of growers to attend a short course of more than one day in duration. Informal surveys and discussion within the industry suggests widely varied opinion regarding this issue. The Australian cotton industry is very dynamic and has in recent times expanded rapidly both in size and technology. This has been achieved largely through an intensive process of meetings, road shows, field days, workshops, conferences and other activities. Parallel with this intensive activity schedule, changes in legislation such as accreditation/licensing to purchase and apply endosulfan, and changes in the tax system have meant growers have had to attend many off-farm activities. There is a definite risk that some growers may be suffering from 'workshop fatigue' and this may have a negative influence on attendance. This situation may also be exacerbated by the fact that historically many growers have considered IPM decisions as the domain of the consultant and thereby may decide not to attend the IPM training.

Research and extension support

Cotton CRC Research entomologists, agronomists and economists from the CRC partner organisations provide extensive support to the short courses as expert presenters of major workshop and field day sessions. Their input has been critically important to the success of the course. Grower participants thoroughly appreciate the participation of highly regarded researchers during those activities. Equally, the researchers value the opportunity for high quality interaction with the growers.

Australian Cotton CRC's National Extension Team Industry Development Officers (IDOs) support the uptake of IPM by conducting trials and demonstrations, delivering information resources and by coordinating and supporting area wide management groups as a significant and high priority focus for the national extension program.

The IDOs are key contributors to the short courses providing local liaison, and encouragement of growers and are involved in presenting some sections during the winter workshop in a local context.

To improve the delivery of the course, the course co-ordinator and all extension staff involved in the course are or will be trained under national accredited standards for "work place training and assessment".

Conclusion

The short course program is now well established

following the delivery of three pilot courses during 2001/02 which allowed for testing and fine tuning of the course to ensure that it best meets grower expectations. Six courses commenced in the winter of 2002 and will be completed by June 2003.

Evidence indicates that the IPM training short course is developing sufficient interest, motivation and confidence in growers to implement appropriate IPM strategies. By learning together it is expected that growers will continue to communicate regularly in developing their IPM management systems. This will lead to changes in farm management involving real changes in management of insects. There will also be long term economic benefits and improved sustainability for cotton growers.

Growers will benefit from a clear understanding of IPM and the knowledge of what has been achieved by those participating in the training will encourage further innovation and adoption. The course will continue to provide a forum for discussion, which should help to provide solutions to real problems and challenge current industry thinking. Perceptions about IPM such as delayed maturity and low yields are being replaced by positive considerations of maintaining profitability and yield while reducing reliance on chemical control measures.

A focus group study by the cotton extension team (Coutts, 2002) and an IPM survey undertaken by the Institute for Rural Futures at the University of New England with Cotton Consultants Australia (Doyle *et al.*, 2001) on behalf of CRDC produced the following conclusions with respect to the understanding and perception of IPM. They have a significant impact on the management and content of the short course and the industry environment in which is delivered.

Integrated pest management has established a wide level of acceptance throughout the cotton industry (Christiansen and Dalton, 2002) with the 2002 studies indicating:

- A high level, broad understanding of IPM principles and practices is evident across all industry sectors.
- The perception of IPM varies between regions.
- IPM was universally viewed as the use of a wide range of tools used in overall farm management.
- The emphasis on different elements of IPM (such as beneficial insects, resistance management strategies, trap crops, damage levels) varied between regions.
- There was particular reference to the need to stay 'soft' as long as possible to avoid getting on the

"merry-go-round" of needing to spray.

This represents a significant change from 1997 where there appeared to be a lack of understanding and confidence in IPM systems amongst both growers and consultants.

Many growers have made a deliberate decision to choose an IPM approach, generally moving gradually towards softer and softer approaches each year. Some growers indicated that their general approach has changed from one of **"if in doubt spray"** to **"if in doubt, don't spray"**. The use of Ingard cotton, and particularly unsprayed refuges, has been regarded as a valuable educational tool in helping to better understand and experience IPM.

There is a feeling that the industry is only just starting to really understand and use IPM. **"Profitability and Sustainability are the key two words. IPM has been bashed around the industry for decades and is something many growers have been playing with but is only coming to the forefront now and hasn't been used to its fullest extent and ability"**. In some regions, whilst IPM was considered the way forward, there was some degree of concern at "being pushed into IPM" by the rest of the industry.

References

- Christiansen, I. and Dalton, W. (2002). Understanding IPM – Industry Attitudes, Practices and Education. Proceedings of the 11th Australian Cotton Conference, ACGRA, 2002. pp 189 – 196.
- Coutts, J.A. (1997). Attitudes to Integrated Pest management in the Cotton Industry. Cooperative Research Centre for Sustainable Cotton Production, Narrabri, NSW.
- Coutts, J. and Cotton Extension Group, (2002). Changes in attitude to Integrated Pest Management in the Cotton Industry: 1997-2001 and Attitudes to Area Wide Management. Draft Report, REC UQ Gatton.
- Dillon, M. and Hoque, Z. (2000). An analysis of pest pressure in an area wide management group. Proceedings of the 10th Australian Cotton Conference, ACGRA.
- Doyle, B., Reeve, I. and Barclay, E. (2001). Cotton Consultants Australia Integrated Pest Management Survey. Institute for Rural Futures, UNE, Armidale.
- Kauter, G., McIntyre, G. and Gibb, D. (2000). Australian Cotton Cooperative Research Centre IPM Short Course – learning together. The Tenth Australian Cotton Conference, Conference Proceedings.

Table 1. *IPM short course structure.*

Structure	Duration	Broad Content	Broad Objective
Winter Workshop	2 days	Define IPM and establish an understanding of its importance and knowledge of components	Understanding how components of IPM can be utilised in Australian cotton production
Summer Field day (1)	½ day	Early squaring practical - plant growth, pests, predators and crop management	Knowledge of the role of effective insect and plant monitoring and confidence in early season IPM practices
Summer Field day (2)	½ day	Post flowering practical - plant growth, pests, predators and crop management	Knowledge of the role of effective monitoring and confidence in late season IPM practices
Autumn Review Meeting	1 day	Post season evaluation of individual IPM programs	Evaluate the implementation of changes in pest management