COTTON RESEARCH AND DEVELOPMENT CORPORATION

FINAL REPORT

"COTTON INDUSTRY DEVELOPMENT OFFICER IN THE MACQUARIE VALLEY"

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NSW Agriculture

"A final report prepared for the Cotton Research and Development Corporation"

COTTON INDUSTRY DEVELOPMENT OFFICER IN THE MACQUARIE

SUMMARY

The position of Cotton Industry Development Officer (C.I.D.O) in the Macquarie Valley was implemented in 1993-94 because much good research generated at Narrabri was not being adopted by local growers. The reason was that there existed a perception that this research was not relevant to the conditions in the Macquarie. There was also concern that trials carried out in small plots did not accurately represent farm scale production.

The intention was to alleviate these problems by placing a C.I.D.O. in the district to demonstrate and prove the usefulness of current research on a large scale. This officer, funded by the CRDC and supported by NSW Agriculture and the Macquarie Cotton Growers Association, would co-ordinate and run a series of on-farm trials in the Macquarie. This would in turn lead to increased adoption of this new technology. James Holden was appointed to the position in September 1993.

In 1993-94 and 1994-95 good trial and extension results were achieved in many areas of cotton production, and aimed to address both local and national priorities. James Holden left the position in September 1995 and it remained vacant for the duration of the 1995-96 season. This season saw a comparatively small area planted to cotton in the Macquarie, approximately 16,000 hectares, around half the area of the previous season.

In the area of insect pest management, work focussed on integrated strategies of pest control. This included *Heliothis* thresholds, soft option sprays, food sprays, lucerne strips, and control of early season sucking pests. There was significant local interest in all of these areas with a good potential for adoption as long as their is a continued extension effort. There are some concerns in the Macquarie that the shorter season will reduce the period of time that plants have to produce compensatory growth, and growers are therefore cautious with the rise in thresholds. Again, this problem could be solved by a series of successful trials demonstrating the advantages of higher thresholds.

The C.I.D.O acted as the local coordinator in the CRC Farming Systems trial. This involved liaising with the cooperators and researchers to ensure smooth running in terms of general management and collection of data.

There were a number of nutritional trials conducted during the project. These trials each year have been largely driven by consultants and corporate farms, with the C.I.D.O running one or two fully replicated trials looking at rates of phosphorus and sulfur in particular.The work in Phosphorus has provided a number of conclusions that were published in an article in the Australian Cotton Grower Magazine titled 'Significant Phosphorous Response in the Macquarie Valley' by James Holden. Potassium trials from previous seasons have shown mixed results in both soil and foliar applied treatments. More intensive research should clear up some of these issues. Some nitrogen trials were completed during the project comparing various rates and timing of application. These trials have confirmed the benefits of split applications, particularly at a sequence of 60-70% pre-plant and side dressing or water running the rest.

Detailed work was done on Pix® (mepiquat chloride) by the C.I.D.O to verify work done by Dr Greg Constable in the Namoi Valley. A CRC research review was written by James Holden on the use of Pix® and presentations on the topic were also made at the 1995 cotton growers field day and the agronomy/ physiology meeting held at ACRI in 1995.

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This project has produced many successful outcomes and provided numerous benefits to the cotton industry in the Macquarie and local support for this suggests that funding should continue. A survey done in June 1995 showed that all growers were pleased with the outcome of the position and wanted to see the funding extended for further 3 year period.

With the very firm base that has been established over the past three years, further work will continue to increase the adoption of new technology. This will be especially important at this time with issues such as transgenic cotton, insecticide resistance, and all aspects of integrated pest management being at the forefront of the industry. Successful adoption of these issues will be greatly enhanced by the presence a Cotton Industry Development Officer in the Macquarie.

INTRODUCTION:

The position of Cotton Industry Development Officer (C.I.D.O) in the Macquarie Valley was implemented in 1993-94 because much good research generated at Narrabri was not being adopted by local growers. The reason was that there exists a perception that this research was not relevant to the conditions in the Macquarie. There was also concern that trials carried out in small plots did not accurately represent commercial conditions.

The intention was to alleviate these problems by placing a C.I.D.O. in the district to demonstrate and prove the usefulness of current research on a large scale. This officer, funded by the CRDC and supported by NSW Agriculture and the Macquarie Cotton Growers Association, would co-ordinate and run a series of on-farm trials in the Macquarie. These trials would be linked to the researchers and their latest findings, their work taken to the field and the results validated for growers.

This work would then be disseminated to growers through small group meetings, trial reports, field days and the Australian Cotton Conference.

OBJECTIVES:

To have cotton growers adopt new technologies on a large scale by assisting them in carrying out on farm trials and/ or demonstrations of new technologies as developed by industry researchers. The results of local trial /demonstration work are to be disseminated to all growers in the valley through small group meetings, field days and publications.

These research and extension activities would focus in the areas of insect pest management, farming systems management, plant nutrition, and weed control.

RESULTS AND DISCUSSION:

From the completed trials in1993-94 and 1994-95 some good results were achieved in all aspects of cotton production in the Macquarie. James Holden left the position in September 1995 and it remained vacant for the duration of the 1995-96 season. This season saw a comparatively small area planted to cotton in the Macquarie, approximately 16,000 hectares, around half the area of the previous season. This was fortunate in the sense that it coincided with there being no C.I.D.O in the district.

A reduced number of trials were conducted by local consultants and growers. These trials were completed in July 1996 and have been submitted for publication in the 1995-96 Macquarie Cotton Field Trial Reports Booklet.

Results and discussion of all cotton production trials during this project are outlined below. It should be mentioned that in each year of this project a trial report was published which covered in great detail the activities completed in each season. These have been included as appendices to this document and can be referred to when more detail is required.

Insect Pest Management

Work in this area has covered many aspects and is at the forefront of industry issues, especially as we become more aware of the importance of integrated pest management. This was indicated in a survey conducted in July- August 1995 where a general consensus suggested that on-farm trials needed to focus more on IPM trials.

The first *Heliothis* threshold trial was carried out in the 1995-96 season and included two treatments, 1 and 2 larvae per metre pre-flowering. Results from this trial were encouraging showing insignificant differences between the two treatments in both lint yield (3.7 bales/acre) and the growth performance of the plants. These encouraging results have inspired some local grower confidence in the concept and several growers have expressed interest in continuing these trials in the 1996-97 season. There has been some hesitancy in the district to include a 4 larvae/ metre treatment in these trials because excessive early season damage. It is hoped that further confidence will be built by continued trial/ demonstration sites and this treatment will be included in future seasons.

A soft option trial was done in the 1994-95 season which had a conventional treatment with 8 sprays and a soft treatment with 3 sprays (including 2 Bt's). Some interesting conclusions were produced. In the early part of the season both treatments performed very well, indicating that predator activity was doing an equivalent job to the conventional insecticides as *Heliothis* thresholds were not reached until early January. In the late part of the season however, (late January) after plants had set most of their fruit, damage occurred and there was not enough time for compensation by the plant. This caused the soft treatment to yield ½ bale/acre less than the conventional treatment. This result is encouraging in that more trust can be put in natural mortality and predator activity early in the season, whether through using soft option or increasing thresholds.

EntomoLOGIC, the industry funded pest management decision support system was promoted by the C.I.D.O by organising training workshops, and where possible demonstrating its effectiveness in on-farm trials.This resulted in two agronomists/ consultants using it as a regular management tool. With the new version being released usage may increase.

The benefits of the Lepton™ test kit were demonstrated by the C.I.D.O by compiling and distributing the local results on a weekly basis to all consultants/ agronomists/ resellers. In 1995 about 50% of growers used the test kit.

Food spray technology was trialed by Dr Robert Mensah with promising results in the 1994-95 season. This trial showed that the food spray resulted in significantly lower egg counts than conventionally sprayed and unsprayed plots. This research will continue in following seasons with its potential for adoption very promising due to local grower interest, both from an environmental perspective and of having less reliance on conventional chemicals. This local interest was demonstrated by the attendance of 60 local agronomists/ growers at a farm walk with Dr Robert Mensah, organised by the C.I.D.O.

Early season pest control trials were carried out in 1993-94 and 1994-95 seasons comparing various planting insecticides and their effect on thrip control, plant vigour and yield. In both years significant differences were seen in thrip numbers, but this had no affect on yield or earliness. This is consistent with Dr Lewis Wilson's work which had shown that thrips do not usually cause reduced yield or earliness. Because of this many foliar applied organophosphate sprays are applied unnecessarily. Removing these sprays would not only provide a cost saving, but would also preserve the number of beneficial insects in the crops.

A cooperative research project entitled 'Minimising the effect of pesticides on the riverine environment' was established in 1994 and the C.I.D.O acted as the local coordinator, assisting in the collection of data and liaising with all involved personnel.

Farming Systems Management.

Most of the farming systems management work in recent years has been centred around the CRC farming systems trial at Auscott field 13. The C.I.D.O acted as the local coordinator in this trial. His work involved liaising with the cooperators and researchers to ensure smooth running in terms of general management and collection of data. There was also scope to help researchers and Auscott in major activities and busy periods. The site was promoted at the 1995 Macquarie Cotton Field Day and the C.I.D.O gave a talk on the trial. Newspaper articles were published about the trial in both local and rural newspapers to promote sustainable cotton production.

Other farming systems work covered in the district during this time was based around row spacing and tillage trials. The C.I.D.O helped growers where necessary with these trials, mainly with picking and the writing up of results.

Plant Nutrition

There were a number of nutritional trials conducted during the project, in particular phosphorus trials. These trials each year have been largely driven by consultants and corporate farms, with the C.I.D.O running one or two fully replicated trials looking at phosphorus and sulfur in particular.

The continued work in phosphorus has provided a number of conclusions that were published in an article in the Australian Cotton Grower Magazine titled 'Significant Phosphorus Response in the Macquarie Valley' by James Holden. The trials indicated that Myall and Wilga clays in the Macquarie Valley will respond to applied phosphatic fertiliser when soil tests indicate levels of P less that 10 mg per kg (Colwell). Other soils have not produced consistent P responses but it was still suggested that soil monitoring should take place to ensure that soil reserves are not being depleted. A CRC research review was written by James Holden on potassium and phosphorus nutrition in cotton.

Potassium trials are set to increase in future seasons especially in areas prone to premature senescence. Trials from previous seasons have shown mixed results in both soil and foliar applied treatments. More intensive research should clear up some of these issues. The C.I.D.O assisted Phillip Wright of ACRI , Narrabri in three potassium trials in the 1994-95 season.

The C.I.D.O provided support to Dr Errol Hoult of UNE - Armidale in the completion of the CRDC funded Lime and Gypsum trial on field 10 at Twynam Buttabone,. This support involved liaising between Dr Hoult and Twynam and taking some of the measurements during the season. In the first two years of the trial there was no significant yield response from any of the treatments ((i). control, (ii) lime, (iii) gypsum, (iv) lime & gypsum). In the third year of the trial (1995-96 season) limited water meant that no cotton was planted on the site, and it was put down to wheat.

Some nitrogen trials were completed during the project comparing various rates and timing of application. These trials have confirmed the benefits of split applications, particularly at a sequence of 60-70% pre-plant and side dressing or water running the rest.

Plant Physiology.

Work in this area has been focussed on the use of mepiquat chloride (Pix ®) as a growth regulant and the promotion of plant mapping as a management tool.

The Pix® trials were conducted by the C.I.D.O to verify work done by Dr Greg Constable in the Namoi Valley. The results showed that that the same Pix® management techniques studied in the Namoi are applicable to the Macquarie. The trials showed that by using a simple plant mapping procedure before first flower, a likely Pix® response can be determined and an application rate worked out for a single application at first flower. The trials also demonstrated that Pix® can have a major impact on earliness (approximately 10 days earlier with 1.0L/ha at first flower), without losing yield in a situation where the crop is not stressed by lack of water. Late applications also gave some degree of earliness but higher rates were needed than the applications at first flower to achieve the same effect.

A CRC research review was written by James Holden on the use of Pix® and the local studies were used as a basis for achieving a Master of Science in Agriculture through the University of Sydney. Presentations on the topic were also made at the 1995 cotton growers field day and the agronomy/ physiology meeting held at ACRI in 1995.

The concept of plant mapping as a management tool was introduced to 100% of consultants and 80% of growers through a series of hands-on workshops in the 1994-95 season. Through these efforts 50% of consultants and 30% of growers (by area) have adopted the concept.

CONCLUSIONS, RECOMMENDATIONS & APPLICATION TO THE INDUSTRY

The CRDC funded employment of a C.I.D.O in the Macquarie ended its first 3 year term in June 1996. A survey done in June 1995 showed that all growers were pleased with the outcome of the position and wanted to see the funding extended for further 3 year period. 54% of growers even suggested that local grower contributions (apart from CRDC) could be used to fund part of the project.

The project produced many successful outcomes as has been outlined previously in this document. It has proved to be a catalyst to the local adoption of technology that has been developed outside the Macquarie. This has covered all facets of cotton production; from the extensive work involved in validating Greg Constables Pix® application theories, demonstrating the benefits of 2 larvae/ metre *Heliothis* threshold, and validating local theories on phosphorus application on various soil types and initial soil P levels.

It has also provided the district with a person who can be responsible for the organisation of field days/ walks and extension meetings and attracting researchers/ industry experts to the area to present their work. Successful events organised as a part of the project included; a soil erosion and pesticide movement day involving QDPI and University of Sydney personnel at Auscott in which 60 people attended, and seedling disease meeting with Dr Steve Allen where 50 people attended. The C.I.D.O also played a large role in organising the Macquarie Cotton Field Days in 1994 and 1995 which consistently attracts around 250 people.

Having a C.I.D.O in the district made it easier for researchers to include the Macquarie in their work as they could act as a liaison between growers and researchers, be involved in the collection of data, and in the dissemination of results to local growers. This has been successful in a number of instances in the past three years such as; assisting Phillip Wright with potassium trials, acting as a local coordinator for the 'minimising the effect of pesticides in the riverine environment' project, being local contact for soil and gypsum trial with Dr Errol Hoult, and as local coordinator for the CRC rotation trial.

Some suggestions have been made by growers about the function of the position and changes/ improvements that could be made. These included, more trial and extension work in the Narromine area, more smaller group field days during the season, and a regular newsletter to be published covering current issues, seasonal information and updates on trials.

This project has provided numerous benefits to the cotton industry in the Macquarie and local support for this suggests that funding should continue. With the very firm base that has been established over the past three years, further work will continue to increase the adoption of new technology. This will be especially important at this time with issues such as transgenic cotton, insecticide resistance, and all aspects of integrated pest management being at the forefront of the industry. Successful adoption of these issues will be greatly enhanced by the presence a Cotton Industry Development Officer in the Macquarie.

COMMUNICATION OF RESULTS:

PUBLICATIONS:

- **1993.** Macquarie Valley Cotton Field Trial Reports, 1992-93 season. *NSW Agriculture Publications*
- **1994.** Macquarie Valley grower survey highlights positive attitudes. *Australian Cotton Grower Magazine,* V15, pg. 51
- **1994.** Macquarie Valley Cotton Field Trial Reports, 1993-94 season. *NSW Agriculture Publications*
- **1994.** The use of Pix as a cotton management tool. *CRC Newsletter for the Research Extension Education Programme,* V1 No. 3, July 1994.
- **1994.** Examining the response of cotton to Pix (mepiquat chloride) applied at first flower in the Macquarie Valley. In *Seventh Australian Cotton Conference Proceedings* 1994, pg 331-336
- **1994.** Phosphorus and Potassium nutrition for cotton. *CRC - Newsletter for the Research Extension Education Programme,* V1 No 4, September 1994.
- **1995.** Macquarie Valley Cotton Field Trial Reports, 1994-95 season. *NSW Agriculture Publications*

- FIELD DAYS & MEETINGS
- **July 1993.** Meeting with consultants and key growers to discuss 1992-93 trials and direction for 1993-94 season. (30 attended)
- **November 1993.** Help organise nutgrass field day with Dr Graham Charles, NSW Agriculture, Narrabri.
- **November 1993.** EntomoLOGIC workshop (30 attended).
- **January 1994.** Help coordinate in-field meeting on Auscott lucerne strip trial with Dr Robert Mensah, NSW Agriculture, Narrabri.
- **March 1994.** Macquarie Cotton Growers Field Day. Helped organise (with Chris Lindsay) and spoke about Pix results, plant mapping.
- **May 1994.** Field day to discuss tillage trials at Whiteacres and Buttabone. (20 attended)
- **May 1994.** Organise AIRAC meeting
- **June 1994.** Spoke on 1993-94 Phosphorous response trials at re-sellers field day
- **June 1994.** Meeting with consultants and key growers to discuss 1993-94 trials and direction for 1994-95 season. (40 attended)
- **November 1994.** EntomoLOGIC 1.7 workshop (25 attended)
- **November 1994.** Seedling disease meeting at Auscott with Dr Stephen Allen (50 attended)
- **December 1994.** Ran three hands-on plant mapping workshops with local agronomists and consultants.
- **December 1994.** Organised Soil Erosion and Pesticide Movement afternoon at Auscott Warren with Mark Silburn, QDPI, and Dr Ivan Kennedy, University of Sydney. (60 attended)
- **January 1995.** Organise a field morning with Dr Robert Mensah, NSW Agriculture Narrabri to discuss IPM and Envirofeast. (60 attended)
- **February 1995.** Organised Spray Technology afternoon with Peter Hughes, University of Qld. and John Marshall, QDPI.
- **March 1995.** Spoke at Macquarie Valley Cotton Field day about the CRC Rotation trial, phosphorous & potassium trials, Pix trials. (250 attended)