

COTTON RESEARCH AND DEVELOPMENT CORPORATION

FINAL REPORT

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COTTON GROWERS

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Organisation: NSW Department of Agriculture

Administrative Contact: Mr. G. Denney, Principal Officer (External Funding)

Telephone: (063) 913 487 **Facsimile:** (063) 913 527

Postal Address: Locked Bag 21, Orange NSW 2800

Project Supervisor: Dr. T.S. Abbott

Position in Organisation: Principal Officer (Soil Management)

Telephone: (063) 913 142 **Facsimile:** (063) 913 206

Postal Address: Locked Bag 21, Orange NSW 2800

Project Staff: Mr D.C. McKenzie, Soil Chemist, Rydalmere
Mr D.J.M. Hall, Soil Chemist, Trangie
Ms S. Greenhalgh, Research Officer (Soils), Trangie
Mr I.G. Daniells, Soil Chemist, Narrabri
Mr D. Larsen, Senior Technical Officer, Narrabri
Ms V. Brooks, Field Assistant, Narrabri
Mr J. Sykes, Special Agronomist (Fibres & Oils), Dubbo
Mr A.J. Shaw, Special Agronomist (Fibres & Oils), Gunnedah
Mr A. Kay, District Agronomist, Warren
Mr R.R. Eveleigh, District Agronomist, Narrabri
Mr P. Castor, District Agronomist, Moree

SOIL MANAGEMENT TRAINING FOR ADVISERS TO COTTON GROWERS

Introduction

The cotton industry is one of the most technologically advanced agricultural industries in Australia. However, advisers to cotton growers often lack confidence in advising their clients on decisions relating to soil management. It was thought that training these advisers would increase their knowledge and skills in soil management, thereby helping to improve and sustain cotton production by reducing soil degradation and lessening the number of expensive ineffective machinery operations in growing cotton.

Thus the project was aimed at improving the level of soil management advice given to New South Wales cotton growers by Departmental advisers and private consultants. The project consisted of a series of three soil management workshops, based on the use of backhoe pits and SOILpak, the soil management decision support system for cotton production on cracking clay soils. The workshops were held at yearly intervals in the main cotton growing areas of New South Wales, and involved a total of approximately 50 participants, as follows:

<u>Location</u>	<u>Dates</u>	<u>Number of Participants</u>
Macquarie Valley	29th-30th August, 1989	15
Namoi Valley	20th-21st June, 1990	20
Gwydir and Macintyre Valleys	23rd-24th July, 1991	15

Macquarie Valley Workshop

This workshop was held at Trangie Agricultural Research Centre and in the surrounding district on 29th and 30th August, 1989. Fifteen commercial and government advisers to cotton growers attended.

The first day of the workshop was devoted to the red loam soils. Dr. Neil McKenzie, CSIRO, Adelaide explained the characteristics and distribution of the red soils in the Macquarie Valley. Then David Hall, Soil Chemist, Trangie spoke of their problems, diagnosis and management for cotton production.

However, most of the day was spent in the field. Participants worked through SOILpak in groups of 5-6 people, using backhoe pits at three sites - undeveloped, recently developed for cotton and back-to-back cotton - on

Agriland Pty. Ltd., Trangie.

Each group diagnosed soil condition and then discussed soil management recommendations for cotton and rotation crops, recording their findings on the SOILpak record sheet. Then the groups came together to compare their diagnosis and management recommendations. Remarkably good agreement between the groups in their recommendations was evident.

A similar format was used on day 2 for the grey and brown cracking clays. Neil McKenzie spoke of their characteristics and distribution, then David McKenzie, Soil Chemist, Rydalmere described their problems, diagnosis and management.

Participants worked on an undeveloped site on the property of Mr M. McKay, "The Overflow", Warren, followed by two developed sites on Auscott Ltd., Warren. Both of the Auscott fields had suffered some soil structural damage caused by picking cotton under wet conditions.

The picking damage was clearly seen, despite the wet conditions which made observation of soil structure difficult. Management recommendations centred around maintenance of existing hills and furrows, and minimum tillage for the next cotton crop. A rotation crop and possible chisel ploughing under dry conditions should follow to help reverse the structural damage, then soil condition checked again to decide on the best tillage option.

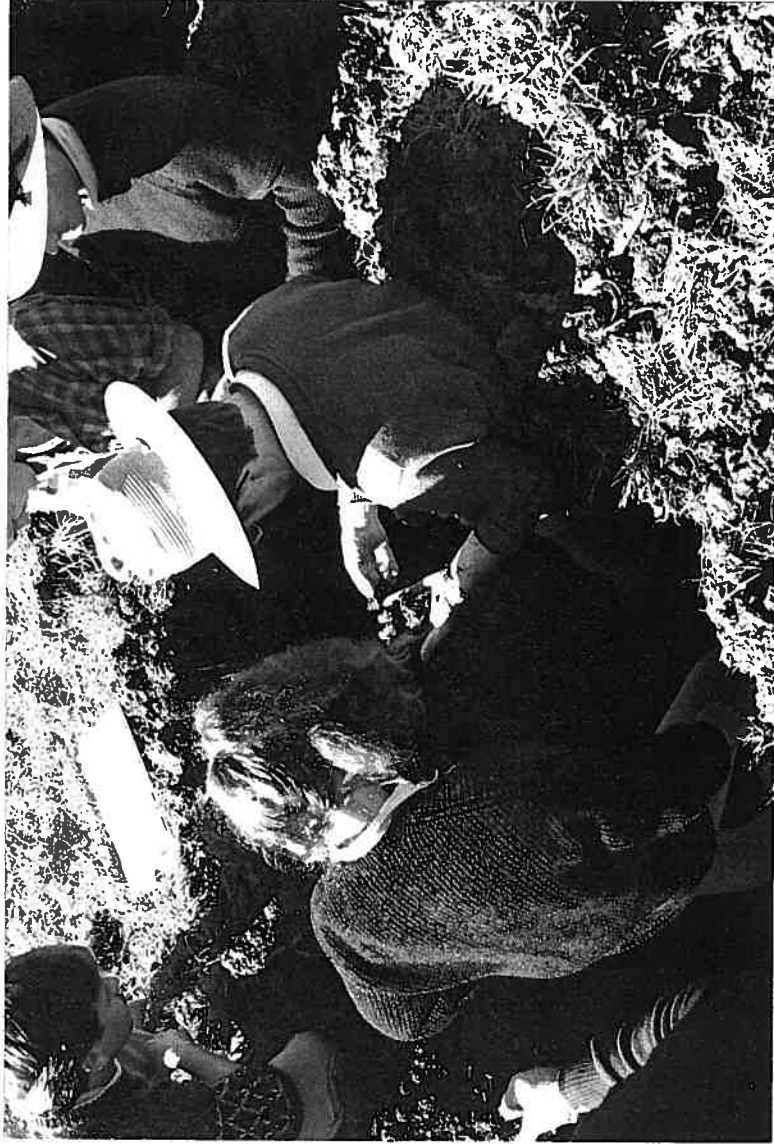
There was general agreement amongst participants that the workshop was most worthwhile. It also generated a number of useful suggestions for improving SOILpak which were incorporated into subsequent editions. Participants were keen to have a follow-up day, after rotation crops had been harvested, to use backhoe pits to look for improvement in soil structure due to the crops. Soil examination at this time helps decide on the best tillage option for ground preparation for the next crop. This follow-up day was held at Auscott Ltd., Warren on 12th December, 1989.

Namoi Valley Workshop

The second workshop was held at the Narrabri Agricultural Research Station and in the Narrabri/Wee Waa area on 20th and 21st June, 1990. Twenty cotton agronomists, advisers and consultants participated.

Most time was devoted to the grey and brown cracking clays, these being the most important soils for cotton production in the Namoi Valley.

On the first day Bill Ward, CSIRO Division of Soils, Brisbane described the characteristics and distribution of the soils of the Valley. Then Des McGarry, Department of Primary Industries, Queensland discussed the problems, diagnosis of condition and management of the cracking clay soils for irrigated cotton production. Ian Daniells, Soil Chemist, Narrabri gave workshop participants an introduction to SOILpak, with emphasis on Chapter C3, "Soil pit observations".



Workshop participants examine soil condition in backhoe pits using SOILpak.

However, most of the day was spent in the field. Participants worked through SOILpak in groups of 5-6, using backhoe pits at four sites - undeveloped and cotton in 1989/90 on a grey clay and a brown clay.

Each group diagnosed soil condition and discussed soil management recommendations for cotton and rotation crops, recording their findings on the SOILpak record sheet.

In both cotton fields the cotton had been picked wet and soil structural damage under the furrows and shoulders of the ridges was evident. Management recommendations centred on keeping existing ridges and furrows in place and minimising tillage before the next cotton crop. A rotation crop and possible chisel ploughing under dry conditions were recommended to reverse the structural damage.

The following day three red soil sites were examined using backhoe pits. All had produced cotton in 1989/90. Two of the three showed signs of soil structural damage and would benefit from a cereal crop or lucerne.

We were fortunate to have Dr Tom Batey, a visiting soil scientist from Scotland, with us for the duration of the workshop. As well as demonstrating his methods of soil diagnosis, Tom made some valuable comments at the end of the workshop. He stressed the importance of:-

- * recording the good features of the soil, not only structural damage, for future reference;
- * making a proper assessment of surface soil condition;
- * using the crop as an indication of where to dig;
- * assessing the value of present management recommendations at some time in the future;
- * using soil examination as a normal part of the work of advisers.

A selection of the participants were surveyed to determine their reaction to the workshop. Most felt that it was useful and would appreciate a follow-up day after rotation crops have been harvested to check on improvement in soil structure due to these crops.

Gwydir and Macintyre Valleys Workshop

This third workshop was held at Moree and in the surrounding district on 23rd and 24th July, 1991. It was attended by 15 cotton agronomists and consultants.

On the first day David McKenzie, Soil Chemist, Rydalmere and Maurie Fay, Moree consultant described the general characteristics and distribution of the grey and brown cracking clay soils of the Valleys. Des McGarry, Department of Primary Industries, Queensland discussed the problems, diagnosis of condition and management of the cracking clays for irrigated cotton production. This was followed by an introduction to SOILpak by David Larsen, Senior Technical

Officer, Narrabri and Ian Daniells, Soil Chemist, Narrabri. Then Terry Haynes, Auscott Ltd., Moree talked about his experience of using SOILpak and backhoe pits for cotton soil management.

However, most of the day was spent in the field. Participants worked through SOILpak in three groups of 5, using backhoe pits at three sites. Each group diagnosed soil condition and discussed soil management recommendations for cotton and rotation crops, recording their findings on the SOILpak record sheet.

The first two sites were on "Windmill", Auscott Ltd., consisting of an undeveloped area and a nearby cotton field showing serious compaction due to very wet picking in 1990.

The third site was field 27, "Midkin South", Auscott Ltd. which has been in permanent beds for 4 years. Its management consists of a rotation of three years' cotton, one year wheat/summer fallow. The wet pick of 1989 resulted in some compaction which was seen as platiness of clods on the shoulders of the beds. However, soil structure was good in the middle of the beds, demonstrating the value of permanent beds.

The following day we examined four sites. The first two were on "Brighann", comparing a well structured undisturbed black earth with an adjacent similar soil under continuous cotton for 12 years. This field has been in permanent beds for 3 years and was tilled when dry in April. Like field 27, "Midkin South", soil structure in the beds was good, with some clod platiness on the bed shoulders.

By way of contrast, the next site was a field on "Kooragama" with a similar history to the "Brighann" field, except that it had been middle busted the previous two wet seasons, also in April. The soil was very cloddy on the surface and showed signs of compaction in the subsoil.

The final site was a field on "Tarcoola" with a history of fallow after wheat in 1989/90, followed by cotton in 1990/91. Here we found a thin band of compaction in the subsoil, but also some evidence that the wheat crop had improved soil structure.

Conclusions

The majority of cotton advisers in New South Wales participated in at least one of the workshops; a few of the keener ones attended more than one. Informal discussions with the participants during and at the end of the workshops invariably indicated satisfaction that they had been worthwhile. A more formal survey conducted by David Larsen after the Namoi Workshop yielded a similar result, with most advisers keen to attend follow-up activities. The survey also showed that advisers find SOILpak useful, particularly in advising their growers.

Therefore it may be concluded that the project succeeded in its aim of improving the level of soil management advice given by cotton advisers to their growers, by

means of increased knowledge and skills in soil management gained through the use of SOILpak in the workshops. Furthermore, the workshops played an important role in the development of SOILpak by virtue of the feedback gained from participants while and after they used it.

However, this project should be regarded as merely the first step in the process of training cotton advisers in soil management skills. It has introduced them to SOILpak and enabled their ideas and suggestions to be incorporated. With the recent publication of the final version of SOILpak the process needs to be continued.

It is planned for this to occur through a new project funded by the Corporation called 'Soil Management Training'. This project will encourage the active use of SOILpak by further training key advisory officers and consultants in soil management skills. Training packages will be developed to help these people disseminate the skills throughout the cotton industry.

Approved Allocations

	Salaries \$	Travel \$	Operating \$	Capital \$	Total \$
1988/89	---	1,960	3,040	---	5,000
1989/90	---	2,080	3,220	---	5,300
1990/91	---	2,380	3,220	---	5,600
Total	---	6,420	9,480	---	15,900

Publications arising from the project

Abbott, T. (1989). Macquarie Valley soil management workshop. The Australian Cottongrower, 10(4), 39-40.

Abbott, T. (1990). Namoi Valley soil management workshop. The Australian Cottongrower, 11(4), 72-74.

Abbott, T. (1991). Gwydir and Macintyre Valleys soil management workshop. The Australian Cottongrower, 12(5), 64-65.

Acknowledgments

In addition to the project staff, many people contributed to the successful conduct of the workshops. We are particularly grateful to the invited speakers, without whom the workshops could not have been held.

We also thank the many landholders who allowed us to dig backhoe pits and work on their properties. Special thanks go to Auscott Ltd. for digging some of the pits on their own and other landholders' properties.