

REPORTS

Part 1 - Summary Details

Please use your TAB key to complete Parts 1 & 2.

CRDC Project Number: DAN 171C (now DAN174C)
Annual Report: Due 30-September
Progress Report: Due 31-January
Final Report: Due 30-September
(or within 3 months of completion of project)

Project Title: Managing problem weeds of irrigated cotton production

Project Commencement Date: 1 Oct 2002 **Project Completion Date:** 30 Jun 2006
Research Program: 3 Crop Protection

Part 2 - Contact Details

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Researcher 2 (Name & position of additional researcher or supervisor).

Organisation:

Postal Address:

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Signature of Research Provider Representative: _____

Part 3.2 – Annual Reports (due end of September)

1. What were your major project objectives, milestones and performance indicators for the past year? (Please list these and any project results).

- Provide extension and technical support for WEEDpak. Promote WEEDpak at grower meetings, field days etc.
- Complete study of nutgrass control in commercial cotton.
- Commence herbicide susceptibility studies for dwarf amaranth, David's spurge and red pigweed.
- Commence germination, growth and seedbank studies on dwarf amaranth, David's spurge and red pigweed.
- Examine temperature and photoperiod effects on peachvine and bell vine and initiate seed dormancy experiment.
- Commence field evaluation of herbicides for dwarf amaranth, David's spurge and red pigweed management in permanent beds with retained stubble.
- Monitor weed density and diversity in commercial cotton.

Additional research work has been undertaken to answer a range of questions raised concerning various aspects of WEEDpak.

2. Which of these have been achieved?

All objectives were largely achieved, all-but-it at a reduced level, as the project was not commenced until October and the input into the finalisation of WEEDpak was far greater than was anticipated.

3. Which were not achieved and why? (Please provide detail of any problems you have had during the year and how you plan to address these problems).

The assessment of nutgrass management in commercial cotton on Auscott was undertaken, but the trial was not completed, as all the monitored fields were in fallow in spring 2002. Assessment this spring and autumn (2003-2004) will show a clearer picture as the fields return to cotton.

4. Do you envisage having problems with any aspects of your research project in the coming year and what is your contingency plan?

The drought and lack of irrigation water has made it impossible to continue work on some field sites. Two new sites for bellvine research have been established at Murgon (Qld), and four herbicide trials are being established at ACRI. Irrigation water is available at both these sites this season. Some trials were planned to be sown into cereal stubble. The cereal was not planted last winter due to the lack of available water. These trials will be conducted without stubble this season, with cereals to be planted into the sites next winter. This should not diminish the final outcomes of these trials.

5. What are your specific project objectives, milestones and performance indicators for the coming financial year? Have any of these changed?

2003 – 2004 objectives are:

- Provide extension and technical support for WEEDpak. Develop a new set of weed identification material and additional weed management information.
- Complete study of nutgrass control in commercial cotton.
- Undertake herbicide susceptibility studies for bellvine, dwarf amaranth, David's spurge and red pigweed.
- Evaluate the tolerance of Roundup Ready cotton to residual herbicides.
- Monitor weed density and diversity in farming systems and commercial cotton.

These objectives have not changed.

6. Are changes to the Intellectual Property Register required? (You may also submit a separate confidential report of information, which should be included in the report but which you reasonably consider is confidential information).

No.

7. How do you plan to demonstrate that your research is addressing the Corporation's three outputs - Economic, Environmental and Social?

The weeds team is working towards reducing the use of herbicides in cotton, particularly residual herbicides, and improving the management of problem weeds, enhancing sustainability. The impact of this work can best be demonstrated by examining the trends in herbicide use for the industry over time, by assessing the sustainability of production and importance of problem weeds, and by monitoring pesticide levels in the river systems. Much of this data is available from independent sources such as the CCA surveys, DIPNR, chemical resellers and chipping contractors.

While analysis of this data was not an objective of this project, such analysis would be a useful component of a review of weeds research planned to occur prior to new funding in 2006.

8. To what extent have your research results to date been disseminated to other researchers, growers or the industry? Please provide details and list any publications.

In the past year, the output of material from this and previous research has been exceptional, including WEEDpak, scientific publications, conferences, meetings and face-to-face discussions with growers.

The major means of dissemination for the weeds team in the last year has been the release and promotion of WEEDpak. WEEDpak is a comprehensive guide to integrated weed management in cotton. Of the material in WEEDpak, I was the primary author of the following sections:

- The weed identification and information guide
- Managing weeds in cotton
- Managing herbicide resistance in cotton
- Research results with Roundup Ready© cotton
- Managing weeds on roads, channels and water storages
- Managing cowvine in cotton
- Managing nutgrass in cotton
- Managing polymeria (take-all) in cotton
- Herbicides for use with pigeon pea trap crops,

And the secondary author of:

- The integrated weed management guidelines
- Managing Roundup Ready© cotton

As part of promotion and support of WEEDpak, I have made numerous presentations to growers and grower groups. Major promotions were undertaken at the 11th Australian Cotton Conference and the Moree Trade Show. To date 610 WEEDpaks have been distributed to the industry, as well as 382 COTTONpaks that include WEEDpak. This has been one of the fastest uptakes of any of the cotton paks.

In the past year I have been the primary or secondary author on the following scientific publications:

Charles G. W. and Taylor I. N. (2003) Managing herbicide resistance and species shift in cotton using an integrated weed management (IWM) approach. 3rd World Cotton Research Conference, Cape Town, South Africa.

Taylor I. N., Charles G. W. and Ichbold B. (2003) Reducing residual pre-emergent or pre-plant herbicide use in cotton through the development of weed thresholds. 3rd World Cotton Research Conference, Cape Town, South Africa.

Johnson S. B., Charles G. W., MacKinnon L., Roberts G. N. and Taylor I. N. (2003) 'Cutting-edge' weed science WEEDpak – A weed identification and management guide for the Australian cotton industry. 3rd World Cotton Research Conference, Cape Town, South Africa.

Johnson S. B., Charles G. W., Christiansen I. H., Hazlewood S. M., Kerlin S. E., Kelly D. G., Roberts G. N., Spora A. C., Taylor I. N. and Watson J. (2002). Getting the message out. WEEDpak - A developing weed identification and management guide for the Australian Cotton Industry. Australian Weeds Conference, Perth.

Johnson S. B., Sindel B. M. and Charles G. W. (2002). The problem of Malvaceae weeds in cotton farming systems. Australian Weeds Conference, Perth.

I was also a secondary author on conference 3 papers:

Taylor I. and Charles G. (2002). Integrated weed management for Australian cotton production systems. Proceedings of the Eleventh Australian Cotton Conference, Brisbane, Qld, pp. 133-145.

Taylor I., Charles G. and Inchbold B. (2002). Improved weed management in irrigated cotton production systems; reducing dependence on residual pre-plant and pre-emergent herbicides. Proceedings of the Eleventh Australian Cotton Conference, Brisbane, Qld, pp. 149-162.

Johnson S. B., Taylor I. N., Sindel B. M., Charles G. W. and MacKinnon L. (2002). The distribution, spread and management of bladder ketmia, anoda weed and velvetleaf in Australian cotton farming systems. Proceedings of the Eleventh Australian Cotton Conference, Brisbane, Qld, pp. 169-176.

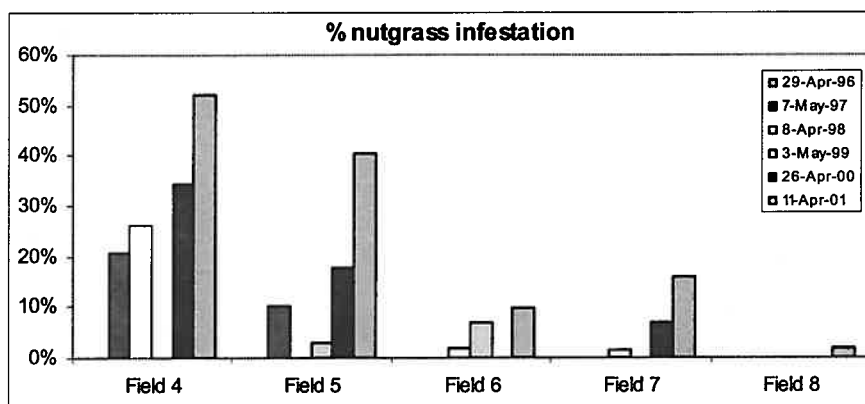
I also made presentations at grower meetings, field days, industry meetings, research reviews and conferences, including the 3rd World Cotton Research Conference, and undertook 3 herbicide efficacy reviews for the NRA.

9. How do you intend to communicate the results or findings of your research to other researchers /growers /industry in the next year? What assistance will you need?

Presentations will be made at field days, workshops and conferences as opportunities arise. Articles will be submitted to the Australian Cotton Grower and new units prepared for WEEDpak. Scientific papers will also be produced from this work. Financial support will be needed when the next units of WEEDpak are ready for publication.

10. Were there major highlights in your work over the last nine months? Please give a brief outline.

- The release of WEEDpak was the major highlight of this project, as has already been discussed. All responses to WEEDpak have been positive, with a number of new areas identified that warrant additional attention.
- The nutgrass infestations on commercial fields at Narrabri had risen from around 0.1% infestation of the surveyed areas in 1995 to an average of 24% infestation in 2001, as shown below.



To examine the effect of Roundup Ready cotton and in-crop glyphosate for managing nutgrass, fields 6, 9, 10, 12 and 13 were divided in half, with one half treated with glyphosate, and the other half sown to conventional cotton and treated with MSMA. Surveys in spring and autumn showed an increase in infestation on the conventional areas from 16.4% to 23.1%, but a decrease in infestation on the Roundup Ready areas from 33.2% to 23.2%. This result confirms other reports of good control of nutgrass using Roundup Ready cotton.

- Herbicide susceptibility experiments have been initiated for dwarf amaranth, pig weed and David's spurge, but only limited results are available to date.

David's spurge seedlings have shown some susceptibility to post-emergence applications of prometryn, while pigweed seedlings were easily controlled using post-emergence applications of diuron, prometryn and fluometuron, as shown below.

% survival of seedlings post application

Herbicide	kg ai./ha	David's spurge	Pigweed	
		2 nodes	2 cm diam	4 cm diam
nil		100%	100%	100%
diuron	0.9	100%	0%	0%
diuron	1.8	100%	0%	0%
prometryn	1.13	100%	0%	0%
prometryn	2.25	50%	0%	0%
prometryn + fluometuron	0.44 + 0.44	63%	0%	0%
prometryn + fluometuron	0.88 + 0.88	63%	0%	0%
fluometuron	1.4	100%	0%	0%
fluometuron	2.8	100%	0%	0%
MSMA	1.12		50%	100%
MSMA	2.24		100%	100%
Staple	0.1		100%	100%
Staple	0.2		50%	25%
Envoke	0.011		0%	25%
Envoke	0.023		25%	0%

- No results are yet available for the weed ecology studies with dwarf amaranth, pig weed and David's spurge.

- An analysis of field results indicates that the susceptibilities of dwarf amaranth and pigweed are:

	Controlled by	Not controlled by
Dwarf amaranth	bromoxynil fluometuron Zoliar	glufosinate-ammonium trifluralin diuron prometryn
Pigweed	metolachlor diuron Zoliar	glyphosate glufosinate-ammonium bromoxynil trifluralin prometryn Staple

Discrepancies between this and the earlier results may relate to weed size at the time of application. Further research will clarify this.