

This publication is brought to you by the Cotton Industry Development and Delivery team...

Ken Flower

GM. Best Practice & Research Implementation
CA, CRC, and CRDC
Mobile: 0457 811 627
ken.flower@cottoncrc.org.au



Susan Maas

Extension Officer DEEDI, Emerald Qld
Farm Hygiene and Disease Lead
Mobile: 0409 499 691
Susan.Maas@dpi.qld.gov.au



Sally Ceeney

Cotton Pest
Management Lead
Cotton CRC, Warren,
NSW
Mobile: 0459 189 771
ms.ceeney@gmail.com



Yvette Cunningham

Communications
Manager, Cotton CRC
ACRI, Narrabri, NSW
Mobile: 0438 992 454
Yvette.Cunningham@csiro.au



Sandra Deutscher

Experimental Scientist
CSIRO, ACRI, Narrabri,
NSW
myBMP Research
Coordinator & Web Tools
Phone: 02 6799 1585
Sandra.Deutscher@csiro.au



Helen Dugdale

Program Manager R&D
Implementation
CRDC, Narrabri, NSW
Mobile: 0417 064 507
helen.dugdale@crdc.com.au



Graham Harris

Irrigated Farming
Systems Team Lead
DEEDI, Toowoomba,
Qld
Water Use Efficiency
Lead
Mobile: 0427 929 103
Graham.Harris@deedi.qld.gov.au



Mark Hickman

Professional
Development Officer
Cotton
DEEDI, Toowoomba, Qld
Training and Education
Lead
Mobile: 0407 113 096
Mark.hickman@deedi.qld.gov.au



James Hill

Cotton Weed
Management Lead
Cotton Australia
Regional Manager
Cotton CRC, Hay, NSW
Mobile: 0408 892317
Jh2solutions@bigpond.com



Dallas King

Farming Systems Lead
Cotton CRC, St George
Mobile: 0427 635 621
Dallas.king.bac@bigpond.com



Dave Larsen

Extension Officer
& Knowledge
Management
I&I NSW, ACRI Narrabri
Technology Resource
Centre Coordinator
Mobile: 0418 432 007
David.Larsen@industry.nsw.gov.au



Tracey Leven

Program Manager,
Farming Systems
Investment
CRDC, Narrabri, NSW
Mobile: 0427 921 555
Tracey.leven@crdc.com.au



Geoff McIntyre

Principal Extension
Officer,
DEEDI, Dalby, Qld
Qld Irrigated Farming
Systems Lead
Mobile: 0419 667451
Geoff.Mcintyre@deedi.qld.gov.au



Janine Powell

Research Economist
I&I NSW, ACRI, Narrabri
Phone: 026799 2469
Janine.Powell@industry.nsw.gov.au



Peter Verwey

Namoi Catchment
Development Officer
Cotton CRC and Namoi
CMA
Mobile: 0408 972 516
Peter.Verwey@csiro.au



Jim Wark

Cotton Industry
Development Specialist
CSD, Toowoomba
myBMP Business
Manager
Mobile: 0427 050 832
jwark@csd.net.au



Duncan Weir

Extension Officer
DEEDI, Toowoomba
Cotton Nutrition and
Soil Health Lead
Mobile: 0410 518 214
duncan.weir@deedi.qld.gov.au



FRONT COVER PHOTOS:
Richard Lloyd, DEEDI
Annie Johnson, I&I NSW
Zara Ludgate, DEEDI
Graham Charles, I&I NSW

The updates for this season's version of the guide would not be possible without additional assistance from –
I&I NSW: Graham Charles, Louise Rossiter, Mark Scott
CSIRO: Sharon Downes, Lewis Wilson
DEEDI: Zara Ludgate, Richard Lloyd, Melina Miles, Dave Murray, Michael Widderick, Vikki Osten, Moazzem Khan and Geoff Cowles
As well as Greg Kauter (Cotton Australia), Stephen Allen (CSD), Kristen Knight (Monsanto), Jodie Pedrana (Monsanto), Bill Gordon, Katrina Murray and Polly Gibbons.

DISCLAIMER

This document has been prepared by the authors for Cotton CRC in good faith on the basis of available information.

While the information contained in the document has been formulated with all due care, the users of the document must obtain their own advice and conduct their own investigations and assessments of any proposals they are considering, in the light of their own individual circumstances.

The document is made available on the understanding that the Cotton CRC, the authors and the publisher, their respective servants and agents accept no representation, statement or information whether expressed or implied in the document, and disclaim all liability for any loss, damage, cost or expense incurred or arising by reason of any person using or relying on the information claimed in the document or by reason of any error, omission, defect or mis-statement (whether such error, omission or mis-statement is caused by or arises from negligence, lack of care or otherwise).

Whilst the information is considered true and correct as at 30 June 2010, changes in circumstances after the time of publication may impact on the accuracy of the information. The information may change without notice and

the Cotton CRC, the authors and the publisher and their respective servants and agents are not in any way liable for the accuracy of any information contained in this document.

Recognising that some of the information is provided by third parties, the Cotton CRC, the authors and the publisher take no responsibility for the accuracy, currency, reliability and correctness of any information included in the document provided by third parties.

The product trade names in this publication are supplied on the understanding that no preference between equivalent products is intended and that the inclusion of a product does not imply endorsement by Cotton CRC over any other equivalent product from another manufacturer.

ISSN 1442-8462

Production by Greenmount Press, July 2010

Liberty® and Liberty Link® are Registered Trademarks of Bayer.

Bollgard II®, Roundup Ready®, Roundup Ready Flex® and PLANTSHIELD® are registered trademarks of Monsanto Technology LLC used under licence by Monsanto Australia Ltd.

BIOTECH
Stewardship
Protecting the science within



It's your future

The benefits of biotechnology are obvious, but how do we ensure their future?

Responsible stewardship of biotech traits is vital to ensuring your continued access to these innovative products. It adds value to your business by ensuring you receive maximum benefit from the technology, protecting your profitability and the local environment as well.

Monsanto, in consultation with industry, aims to equip growers with the tools they need to get the most from biotech traits. Our Regional Business Managers are located in key growing regions to give helpful advice on our products and effective product stewardship for sustainable long-term use.

By working together we hope to ensure a sustainable and productive industry for future generations.

For more information on Biotech Stewardship visit www.monsanto.com.au or call 1800 069 569 to be connected through to your Regional Business Manager.

© Roundup Ready Flex, Bollgard II and Roundup Ready are registered trademarks of Monsanto Technologies LLC, used under licence by Monsanto Australia Ltd.







Contents...

WHAT'S NEW

| | |
|----------------------|---|
| From the editor..... | 4 |
| Index of Tables..... | 4 |

INSECTS

| | | |
|------------------------------------------------------|----|------------------------------------------------------------------------------------------------------------------------------------|
| Key Insect and Mite Pests of Australian cotton | 5 | Sponsored by –  Bayer CropScience |
| Insect pest and damage thresholds..... | 34 | |
| Insecticides: Trade names and marketers | 36 | Sponsored by –  SUMITOMO CHEMICAL |
| Beneficial Insect Attractants and Additives..... | 42 | |
| Integrated Pest Management | 43 | Sponsored by –  syngenta |
| IRMS Strategy..... | 61 | Sponsored by –  DUPONT The miracles of science® |
| Bollgard II Resistance Management Plan | 70 | |

WEEDS

| | |
|---------------------------------------------|-----|
| Integrated Weed Management | 84 |
| IWM approach to problem weeds | 89 |
| Potential for Herbicide Resistance | 94 |
| Herbicide Tolerant Technology..... | 99 |
| Cotton Weed Control Guide..... | 104 |
| Herbicides: Trade names and marketers | 108 |

DISEASES

| | |
|--------------------------------------------|-----|
| Integrated Disease Management..... | 115 |
| Common Diseases of Cotton..... | 117 |
| Cotton Pathology Survey | 122 |
| Cotton Disease Control Guide | 126 |
| Fungicides: Trade names and marketers..... | 127 |

PGRs & DEFOLIANTS


| | |
|---------------------------------------------------------|-----|
| Cotton growth regulators and defoliants | 128 |
| Plant growth regulators: Trade names and marketers..... | 128 |
| Defoliants: Trade names and marketers..... | 130 |

BIOSECURITY

| | |
|---------------------------------------------------|-----|
| Cotton industry biosecurity plan..... | 131 |
| Exotic pests and diseases of greatest threat..... | 132 |

SPRAY APPLICATION

| | | |
|--------------------------------------------------------------|-----|--|
| Best Practices for aerial and ground spray application | 136 | |
| Nozzle selection process for ground application..... | 144 | |
| Legal responsibilities in applying pesticides..... | 146 | |
| Re-entry Periods and Plant-backs..... | 153 | |

Sponsored by –  JOHN DEERE

MY BMP

| | |
|--------------------------------------------------------------------|-----|
| myBMP – A web based management system for the cotton industry..... | 155 |
| Index | 156 |

From the editor

What's new?

The cotton industry has valued the I&I NSW contribution to the industry through publication of this manual over many years. While the I&I NSW contribution to this publication continues through various authors, copyright of the publication now rests with the Cotton CRC. This has enabled the exciting new look, possible through publishing with the long held industry partner, Greenmount Press and the sponsors.

Summary of changes

There has been a major changes to the order of the insect section, with the table of registered insecticides for a species, immediately following the sampling and threshold information for that species. Having trouble finding insect information? Refer to the table on this page for quick reference.

There have been no changes to thresholds for any insects for this season.

Two new pests have been included due to their potential impact for 2010/11:

- Solenopsis mealybug (page 31); and
- Australian plague locust (page 28).

The Bollgard II RMP for Northern Australia (Ord River irrigation and Burdekin Bowen Basin Areas) has been included on page 80-81.

Due to the reliance on pigeon pea refuges for Bt resistance management, pigeon pea agronomy has been covered (page 82-83).

In addition to general integrated weed management tactics, some specific information for the following problem weeds has been included on page 89:

- Barnyard Grass (*Echinochloa crus-galli*);
- Awnless Barnyard Grass (*Echinochloa colona*);
- Liverseed Grass (*Urochloa panicoides*);
- Cowvine (*Ipomoea lonchophylla*);
- Polymeria (*Polymeria longifolia*);
- Common Sowthistle (*Sonchus oleraceus*);
- Nutgrass (*Cyperus rotundus*);
- Feathertop Rhodes Grass (*Chloris virgata*); and,
- Flaxleaf Fleabane (*Conyza bonariensis*)

The 2009/10 disease survey results are published on page 122.

The spray application section has been updated and legal responsibilities for sprays has been moved to this section with additional information for Queensland growers.

The practices required to address the crop protection issues in this guide are detailed and resourced in myBMP. Go to page 155 of The Guide to find out more about myBMP and how to participate.

Good luck for the season ahead.

Regards,
Susan Maas
Cotton CRC Extension Team

| INDEX OF TABLES | | |
|-----------------|---------------------------------------------------------------------------------------------|------|
| Table | Description | Page |
| Table 1 | Control of <i>Helicoverpa</i> spp. | 10 |
| Table 2 | Control of aphids | 13 |
| Table 3 | Control of mirids | 17 |
| Table 4 | Yield reduction caused by mites | 21 |
| Table 5 | Control of mites | 22 |
| Table 6 | Control of silverleaf whitefly | 25 |
| Table 7 | Control of thrips | 28 |
| Table 8 | Control of green vegetable bug | 29 |
| Table 9 | Control of armyworm, cutworm and tipworm | 32 |
| Table 10 | Control of wireworm | 33 |
| Table 11 | Control of cotton leafhopper | 33 |
| Table 12 | Control of rough bollworm | 33 |
| Table 13 | Control of pink spotted bollworm | 33 |
| Table 14 | Insect pest and damage thresholds | 34 |
| Table 15 | Insecticide trade names and marketers | 36 |
| Table 16 | Food sprays and spray additives | 42 |
| Table 17 | Food sprays and spray additives trade names and marketers | 42 |
| Table 18 | Impact of insecticides at planting or as seed treatments on key beneficial groups in cotton | 57 |
| Table 19 | Impact of insecticides and miticides on predators, parasitoids and bees in cotton | 58 |
| Table 20 | Seasonal activity plan for IPM | 60 |
| Table 21 | Herbicide plant backs from rotation crops to cotton | 92 |
| Table 22 | Plant backs to cotton for herbicides used in seedbed preparation | 93 |
| Table 23 | Herbicides with unknown plant back periods to cotton | 93 |
| Table 24 | Cotton herbicide plant backs to rotation crops | 93 |
| Table 25 | Australian weeds with resistance to the Mode of Action (MoA) groups used in cotton | 94 |
| Table 26a | Control of weeds in dry channels | 104 |
| Table 26b | Control of weeds around aquatic areas | 104 |
| Table 27 | Weed control before planting | 105 |
| Table 28 | Weed control at planting | 106 |
| Table 29 | Weed control after planting and before crop emergence | 106 |
| Table 30 | Weed control pre harvest | 106 |
| Table 31 | Weed control after crop emergence (includes layby) | 107 |
| Table 32 | Herbicide trade names and marketers | 108 |
| Table 33 | Control of Cotton Diseases | 127 |
| Table 34 | Fungicide trade names and marketers | 127 |
| Table 35 | Plant growth regulators | 128 |
| Table 36 | Plant growth regulators trade names and marketers | 128 |
| Table 37 | Cotton defoliation products | 129 |
| Table 38 | Defoliation products trade names and marketers | 130 |
| Table 39 | Cotton insecticides with known residual toxicities to honey bees | 149 |