QUESTIONS?
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kate.connors@bayer.com

GROWING COTTON IN NORTHERN AUSTRALIA

2019/20 GROWER GUIDE

bollgard3.com.au

Please refer to the 2019/20 Bollgard II, Bollgard 3, Roundup Ready Flex cotton Technology User Agreement (“TUA”) for Northern Australia General Terms and Conditions before you plant for full details on the Northern Australia Development Offer program and on growing Bayer’s cotton traits in the 2019/20 season.

The term ‘price’ refers to the TUA Fee(s) as defined in the Technology User Agreement General Terms and Conditions document.

Bayer has made every effort to ensure the accuracy of the information provided. However, Bayer makes no express or implied warranties as to the recommendations and assumes no liability for loss, damage, injury or civil action incurred by those who use it. Any reference to products or companies is not an endorsement of a warranty of those products or companies.
Australian cotton growers are some of the best in the world, achieving yields well in excess of world averages and producing some of the best fibre quality cotton. This makes Australian cotton attractive to merchants and spinners around the globe.

The modern Australian cotton industry has grown from humble beginnings with its roots in the Namoi valley of north west New South Wales, to a professional, technologically advanced industry spanning from Northern Australia into Victoria.

In recent years, the industry has seen substantial expansion into areas once thought impractical to cotton growing. Through plant breeding and advances in biotechnology, the Australian cotton industry has been expanding into new regions, including south of the Victorian border and north into the Flinders River in the Gulf of Carpentaria and the Ord River Irrigation Scheme in Western Australia.

Currently irrigated cotton accounts for the majority of annual production, however, in recent seasons the popularity of cotton as a dryland crop has seen an increase in the area planted to dryland cotton.

Further information, resources and tools including a gross margin calculator are available at www.acresofopportunity.com.au

Cotton is one of Australia’s most important summer crops. In an average year, Australia’s cotton growers produce enough cotton to clothe 500 million people. It is a major commodity, representing from 30 to 60 percent of the gross value of the total agricultural production in Australian regions where it is grown, helping to underpin more than 50 rural communities.

Australian Grown Cotton Sustainability Report, 2016
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THE EVOLUTION OF BOLLGARD® TECHNOLOGY IN AUSTRALIA

INGARD® cotton was the first commercially grown genetically modified crop in Australia. INGARD was succeeded by Bollgard II® which contained two Bacillus thuringiensis (Bt) genes Cry1Ac and Cry2Ab. Bollgard 3 contains both Cry1Ac and Cry2Ab along with another Bt gene, Vip3A. These genes code for proteins that control certain species of Lepidopteran pests when ingested.

WHAT IS BOLLGARD 3?

Bollgard 3 contains a third protein, Vip3A, to reinforce the Bt proteins found in Bollgard II – Cry1Ac and Cry2Ab. Having three proteins will increase the longevity of the technology, each having a different mode of action or ‘killing’ larvae in a different way.

The addition of the third protein increases the sustainability of the technology as it becomes increasingly difficult for Helicoverpa to develop resistance to more than one of the Bt proteins.

Bollgard 3 plays a critical role in ensuring that the technology will continue to perform the way that growers need and expect for many years to come.

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LEADING INSECT-CONTROL TECHNOLOGY

THREE MODES OF ACTION

Each of the three proteins in Bollgard 3 – Cry1Ac, Cry2Ab and Vip3A – has a different mode of action or “kill” the larvae in a different way. This allows growers to effectively control H. armigera and H. punctigera for most of the cotton season.

REDUCED NEED FOR BROAD-SPECTRUM PESTICIDE SPRAYS

Bollgard 3 significantly reduces the need for application of broad-spectrum pesticides, giving other insects, including beneficials, the chance to develop as well as reducing water, soil and air contamination.

GREATER FIRST POSITION FRUIT RETENTION

In comparison with conventional cotton plants, Bollgard 3 plants have significantly higher first-position retention on the bottom five fruiting branches. Loss of first-position fruit can result in a significant yield penalty.

AN EASIER WAY TO GROW COTTON

PLAN TO YOUR SCHEDULE

Bollgard 3 provides you with the flexibility to plant your cotton crop when the conditions are most suitable.

MAXIMISE YOUR PRODUCTIVE AREA

Bollgard 3 helps you to get the most from your cotton area, while ensuring the longevity of the technology for all growers through proactive resistance management.

CONSERVE SOIL MOISTURE

If Bollgard 3 cotton crops are defoliated before March 31, there’s no need to pupae-bust meaning less tillage and fuel use, and more soil moisture for subsequent crops.

WHAT IS BOLLGARD® 3?
WHAT IS ROUNDUP READY FLEX® COTTON?

Roundup Ready Flex cotton has been modified using gene technology to tolerate applications of glyphosate, the active ingredient in the Roundup® family of herbicides.

Roundup Ready® Herbicide with PLANTSHEILD® and Roundup Ready® PL Herbicide with PLANTSHEILD® Technology are both registered for use over-the-top of Roundup Ready Flex cotton. They are the only products with patented PLANTSHEILD crop-safener technology protecting your crop in a wide range of conditions. A total of all applications in-crop must be no more than four (4) applications through all growth stages.

IN-CROP WEED CONTROL

GLYPHOSATE APPLICATION GUIDELINES

EMERGENCE

ROUNDUP READY HERBICIDE
WITH PLANTSHEILD®
UP TO 4 x 1.5 kg/ha APPLICATIONS

ROUNDUP READY PL HERBICIDE
WITH PLANTSHEILD® TECHNOLOGY
UP TO 4 x 1.9 L/ha APPLICATIONS

OPEN BOLL

ROUNDUP READY HERBICIDE
WITH PLANTSHEILD®
UP TO 4 x 1.5 kg/ha APPLICATION

ROUNDUP READY PL HERBICIDE
WITH PLANTSHEILD® TECHNOLOGY
UP TO 4 x 1.9 L/ha APPLICATION

HARVEST

ROUNDUP READY HERBICIDE
WITH PLANTSHEILD®
UP TO 6 x 1.5 kg/ha APPLICATION

ROUNDUP READY PL HERBICIDE
WITH PLANTSHEILD® TECHNOLOGY
UP TO 6 x 1.9 L/ha APPLICATION

TOTAL APPLICATIONS

6 APPLICATIONS
6.0 kg/ha

6 APPLICATIONS
7.6 L/ha

Refer to product label for more information.

2019/20 TECHNOLOGY FEES & END POINT ROYALTY

Cotton in Northern Australia is a developing industry. Bayer are committed to supporting growers in the area to get the best from their crops.

As a result, we have developed a Northern Australia Development Offer, enabling growers to pay their technology fee through an End Point Royalty (EPR). This EPR takes into account the challenges Northern Australian growers currently face with a lack of infrastructure in the developing cotton industry. The EPR allows growers to pay their technology fee on a per bale basis, after ginning, to help manage production risk.

<table>
<thead>
<tr>
<th>Product</th>
<th>Price per bale (Ex.GST)</th>
<th>Payment due</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bollgard® 3/ Roundup Ready Flex®</td>
<td>$32.50</td>
<td>30 days from the end of the month of invoice*</td>
</tr>
</tbody>
</table>

Notes:
- Prices exclude GST. *Payment date is 30 days after the end of the month of the invoice date (i.e. the date on the invoice given to your Technology Service Provider (TSP)).
- This offer does not apply to Roundup Ready Flex unsprayed cotton refuges over 10% of the Bollgard II area or 5% of the Bollgard 3 area (as per the trait's Resistance Management Plan requirements), or to sprayed Roundup Ready Flex, as nominated in the planting audit.
- This offer is only available to cotton grown north of the latitude 21.15 degrees south in QLD, NT and WA in the 2019/20 season.
- Growers must hold a 2019/20 Technology User Agreement with Monsanto Australia Pty Ltd to be eligible for this offer.

Accreditation

Prior to planting any Bayer technologies, including Bollgard 3, growers must complete an accreditation course. The accreditation course is an important part of the Bayer stewardship system and provides information on the process required to grow the technology and also outlines the key strategies within the Resistance Management Plan (RMP). Further information on completing an accreditation course can be found by contacting your Territory Business Manager.

Resistance Management Plan

Bollgard 3 contains three proteins, Cry1Ac, Cry2Ab and Vip3A, each of which have a different mode of action, or “kill” larvae in a different way. This allows growers to protect against Helicoverpa spp.

To ensure the longevity of Bollgard 3, an RMP has been developed, specifically for Northern Australia. Compliance with this RMP is critical in protecting the technology into the future.

The RMP can be downloaded at bollgard3.com.au
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ACCREDITATION AND IMPORTANT DATES

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Key dates for Bollgard®3 and Roundup Ready Flex® in the
Northern Australia Region

<table>
<thead>
<tr>
<th>Technology Cotton Seed</th>
<th>Planting Dates</th>
<th>Planting Audit Due Dates</th>
<th>Mid-Season Survey Due Dates</th>
<th>End-of-Season Survey Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bollgard 3 / Roundup Ready Flex</td>
<td>6 week planting window between December 1 and May 30</td>
<td>Due 2 weeks after the 6-week planting window has closed</td>
<td>Due 4 weeks after the planting audit due date</td>
<td>Due 8 weeks after the mid season audit (dependent on picking time)</td>
</tr>
</tbody>
</table>

Notes:
- All audits are conducted by your nominated Technology Service Provider (TSP) who will record all the areas planted with Technology Cotton Seed (together with varieties, field names and associated refuges on all farm units).
- Bayer will advise growers of audit dates once the planting window has been finalised for the region.
- Each valley has a unique planting window

Useful Resources
Bollgard 3 website: bollgard3.com.au
Includes product guide, technical manual, refuge planning guide and the Northern Resistance
Management Plan

Acres of Opportunity: acresofopportunity.com.au
Technical and support information for new cotton growers, both dryland and irrigated

Cotton Seed Distributors: www.csd.net.au
Cotton variety information
RESISTANCE MANAGEMENT PLAN FOR BOLLGARD II® COTTON - ORD RIVER IRRIGATION AND BURDEKIN BOWEN BASIN AREAS

Developed by Monsanto Australia Pty Limited and the Transgenic and Insect Management Strategy (TIMS) Committee of Cotton Australia Limited.

The resistance management plan is based on three basic principles: (1) minimising the exposure of Helicoverpa spp. to the Bacillus thuringiensis (Bt) proteins Cry 1Ac and Cry 2Ab; (2) providing a population of susceptible individuals that can mate with any resistant individuals, hence diluting any potential resistance; and (3) removing resistant individuals at the end of the cotton season. The three principles are supported through the implementation of 5 elements that are the key components of the Resistance Management Plan.

These elements are:
1. Refuge crops
2. Planting window
3. Pupa busting/Trap crops
4. Control of volunteers and ratoon cotton and
5. Spray limitations.

Growers of Bollgard II cotton are required to practice preventative resistance management as set out below. Compliance with the Resistance Management Plan is required under the terms of the Bollgard II Technology User Agreement and under the conditions of registration (Agricultural and Veterinary Chemicals Act, 1994).
1. Refuges

Growers planting Bollgard II cotton will also be required to grow a refuge crop that is capable of producing large numbers of Helicoverpa spp. moths which have not been exposed to selection with Bt proteins Cry 1Ac and Cry 2Ab. These unsellected moths are expected to dominate matings with any survivors from Bollgard II crops and thus help to maintain resistance to Bt proteins Cry 1Ac and Cry 2Ab at low levels.

All refuge options are based on the requirement of a 10% unsprayed cotton refuge or its equivalent as determined by the relative production of Helicoverpa spp. from each of the refuge types as described in the tables below.

For each area of irrigated Bollgard II cotton planted, a grower is required to plant a minimum of one, or a combination of, the following:

1. Conventional Cotton
2. Pigeon Pea
3. Chick Pea

For the purposes of this Resistance Management Plan, conventional cotton includes any cotton varieties that do not have Bt proteins with the exception of Bollgard II unless a sufficient buffer is in place to prevent insecticide drift.

Unsprayed means not sprayed with insecticides that target any life stage of Helicoverpa spp. from each of the refuge types as described in the tables below.

Note: Unsprayed means not sprayed with insecticides that target any life stage of Helicoverpa spp.

All Bollgard II crops and cotton refuges are to be planted into moisture or watered-up in a five week window. In each region, the start date of the planting window will be determined by TIMS in consultation with local growers and reflected in a regionally amended “Bollgard II Planting Window Variation Notice”.

The planting window will occur within the following periods:

- **Ord River Irrigation Area:** March 1 and May 1.
- **Burdekin Bowen Basin Area:** December 1 and April 1.
- **Richmond Area:** December 1 and April 1.

### Table 1. Irrigated Bollgard II cotton refuge options

<table>
<thead>
<tr>
<th>Crop</th>
<th>Conditions</th>
<th>% of Bollgard II</th>
<th>Regions permitted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional Cotton</td>
<td>Irrigated, unsprayed conventional cotton</td>
<td>10</td>
<td>All Regions</td>
</tr>
<tr>
<td>Pigeon Pea</td>
<td>Fully irrigated, unsprayed</td>
<td>5</td>
<td>All Regions</td>
</tr>
</tbody>
</table>

Note: Unsprayed means not sprayed with insecticides that target any life stage of Helicoverpa spp.

### General conditions for all refuges:

- **(a)** Refuge crops are to be planted and managed so that they are attractive to Helicoverpa spp. during the growing period of the Bollgard II cotton varieties.

- **(b)** Pigeon pea refuges should not be planted until the soil temperature reaches 17ºC, which is a requirement for germination, and should also be planted into moisture to ensure successful germination. If soil temperatures are not suitable to allow germination of pigeon peas in line with condition (a), an alternative refuge must be planted in its place within the prescribed period (under (a) above).

- **(c)** Once the Bollgard II cotton begins to flower the corresponding refuge must not be cultivated.

- **(d)** Insecticide preparations containing Bt may be used on Bollgard II cotton throughout the season BUT not on any refuge crops.

- **(e)** All refuges are to be planted within the farm unit growing Bollgard II cotton. Subject to clause (f) below, all reasonable effort should be taken to plant the refuge either on one side of, or next to, a Bollgard II cotton field, and all Bollgard II fields must be no more than 2 km from the nearest Bollgard II refuge.

- **(f)** To minimise the possibility of refuge attractiveness being affected by herbicide drift, non-herbicide tolerant refuges should be separated from herbicide tolerant Bollgard II cotton crops by a sufficient distance to minimise such drift, but no more than 3km from the Bollgard II cotton.

- **(g)** To account for possible insecticide drift, Bollgard II refuge crops must be at least 24 metres wide and 24 metres long. Different unsprayed refuge options may be planted in the same field as a single unit.

- **(h)** Shallowing of plants within the refuge should only be carried out after Bollgard II cotton lint removal has been completed. Soil disturbance of refuge crops can only occur 2 weeks after Bollgard II cotton plants have been harvested.

- **(i)** Refuge for Bollgard II crops must be planted in the same row configuration as the Bollgard II crop.

### 2. Control of volunteer and ratoon cotton

Volunteer and ratoon cotton may impose additional selection pressure on Helicoverpa spp. to develop resistance to the Bt proteins Cry 1Ac and Cry 2Ab produced by Bollgard II cotton.

Growers must make all reasonable efforts to remove volunteer and ratoon plants as soon as possible from all fields - including fallow areas, Bollgard II crops, conventional cotton crops and all refuges. The presence of Bollgard II volunteers/ratoon cotton in any refuge will diminish the value of the refuge and must be removed as soon as possible.

Note: The refuge should preferably be planted into fallow or rotation fields that have not been planted to cotton in the previous season.

### 3. Post-harvest crop destruction

As soon as practical after harvest, Bollgard II cotton crops must be destroyed by cultivation or herbicide so that they do not continue to act as hosts for Helicoverpa spp. Unsprayed refuges must be left uncultivated for two weeks after harvest to allow emergence of any pupating Helicoverpa spp.

### 4. Planting windows

All Bollgard II crops and cotton refuges are to be planted into moisture or watered-up in a five week window. In each region, the start date of the planting window will be determined by TIMS in consultation with local growers and reflected in a regionally amended “Bollgard II Planting Window Variation Notice”.

The planting window will occur within the following periods:

- **Ord River Irrigation Area:** March 1 and May 1.
- **Burdekin Bowen Basin Area:** December 1 and April 1.
- **Richmond Area:** December 1 and April 1.

### 5. Refuge

Unsprayed Pigeon Pea refuge should preferably be planted into a fallow or rotation field that has not been planted to cotton in the previous season.

### 6. End of season chick pea trap crop

An end of season chick pea trap crop must be planted. The planting configuration of the trap crop should be the same as that of the Bollgard II crop. Table 2 shows the requirements for the chick pea trap crop.
1. Refuges

Growers planting Bollgard II cotton will also be required to grow a refuge crop that is capable of producing large numbers of Helicoverpa spp. moths which have not been exposed to selection with Bt proteins Cry 1Ac and Cry 2Ab. These unsolicited moths are expected to dominate matings with any survivors from Bollgard II crops and thus help to maintain resistance to the Bt proteins Cry 1Ac and Cry 2Ab at low levels.

All refuge options are based on the requirement of a 10% unsprayed cotton refuge or its equivalent as determined by the relative production of Helicoverpa spp. from each of the refuge types as described in the tables below.

For each area of irrigated Bollgard II cotton planted, a grower is required to plant a minimum of one, or a combination of, the following:

- Conventional Cotton Irrigated, unsprayed conventional cotton
- Pigeon Pea

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</tbody>
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Note: Unsprayed means not sprayed with insecticides that target any life stage of Helicoverpa spp.

Bt products must not be applied to any refuge.

If the viability of an unsprayed refuge is at risk due to early or late season pressure by Helicoverpa spp., or any other caterpillar species, contact Monsanto immediately. With prior approval from the Monsanto Compliance and Stewardship Manager, a non-Bt helicocid can be applied.

An unsprayed refuge should not be planted in the same field as any crop sprayed with a rate of insecticide that is registered for Helicoverpa spp, with the exception of Bollgard II unless a sufficient buffer is in place to prevent insecticid drift.

Sprayed crops and unsprayed refuges that are planted in adjacent fields must also be separated by sufficient distance to minimize the likelihood of insecticide drift onto the unsprayed refuge.

For the purposes of this Resistance Management Plan, conventional cotton includes any cotton varieties that do not have Bt proteins in the plant that control Helicoverpa spp. larvae.

General conditions for all refuges:

(a) Refuge crops are to be planted and managed so that they are attractive to Helicoverpa spp. during the growing period of the Bollgard II cotton varieties.

(b) It is preferable that all refuge is planted within the 2 week period prior to planting Bollgard II. If this is not possible, refuge planting must be completed within 3 weeks of the first day of sowing of Bollgard II. At this time, sufficient refuge must have been planted to cover all of the Bollgard II cotton proposed to be planted for the season (including Bollgard II already planted and any that remains unplanted).

(c) Should additional Bollgard II planting be made after this date, which is not already covered by refuge, additional refuge must be planted as soon as possible and no more than 2 weeks after sowing of the additional Bollgard II.

(d) Pigeon pea refuges should not be planted until the soil temperature reaches 17ºC, which is a requirement for germination, and should also be planted into moisture to ensure successful germination. If soil temperatures are not suitable to allow germination of pigeon peas in line with condition (a), an alternative refuge must be planted in its place within the prescribed period under (a) above.

(e) Once the Bollgard II cotton begins to flower the corresponding refuge must not be cultivated.

(f) Insecticide preparations containing Bt may be used on Bollgard II cotton throughout the season BUT NOT on any refuge crops.

(g) All refuges are to be planted within the farm unit growing Bollgard II cotton. Subject to clause (i) below, all reasonable effort should be taken to plant the refuge either on one side of, or next to, a Bollgard II cotton field, and all Bollgard II fields must be no more than 2 km from the nearest Bollgard II refuge.

(i) To minimise the possibility of refuge attractiveness being affected by herbicide drift, non-herbicide tolerant refuges should be separated from herbicide tolerant Bollgard II cotton crops by a sufficient distance to minimise such drift, but no more than 2km from the Bollgard II cotton.

(g) To account for possible insecticide drift, Bollgard II refuge crops must be at least 24 metres wide and 24 metres long. Different unsprayed refuge options may be planted in the same field as a single unit.

(h) Slashing of plants within the refuge should only be carried out after Bollgard II cotton lint removal has been completed. Soil disturbance of refuge crops can only occur 2 weeks after Bollgard II cotton plants have been harvested.

(i) Refuges for Bollgard II crops must be planted in the same row configuration as the Bollgard II crop.

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3. Post-harvest crop destruction

As soon as practical after harvest, Bollgard II cotton crops must be destroyed by cultivation or herbicide so that they do not continue to act as hosts for Helicoverpa spp. Unsprayed refuges must be left uncultivated for two weeks after harvest to allow emergence of any pupating Helicoverpa spp.

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All Bollgard II crops and cotton refuges are to be planted into moisture or watered-up in a five week window. In each region, the start date of the planting window will be determined by TIMS in consultation with local growers and reflected in a regionally amended “Bollgard II Planting Window Variation Notice”.

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5. Refuge

Unsprayed Pigeon Pea refuge should preferably be planted into a fallow or rotation field that has not been planted to cotton in the previous season.

6. End of season chick pea trap crop

An end of season chick pea trap crop must be planted. The planting configuration of the trap crop should be the same as that of the Bollgard II crop. Table 2 shows the requirements for the chick pea trap crop.
Table 2. End of season chick pea trap crop requirements

<table>
<thead>
<tr>
<th>Criterion</th>
<th>End of season chick pea trap crop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum area &amp; dimensions</td>
<td>A trap crop of 1% of planted Bollgard II crop area is required. This planting must be at least 24 m x 24m wide.</td>
</tr>
<tr>
<td>Planting time</td>
<td>In April for Burdekin Bowen Area. In July/August for Ord area. The trap crop is to be planted such that it is attractive to Helicoverpa spp. from 2 weeks before defoliation of the Bollgard II cotton. It must remain attractive to Helicoverpa spp. until at least 2 weeks after defoliation of the Bollgard II cotton.</td>
</tr>
<tr>
<td>Insect control</td>
<td>The trap crop should be monitored and sprayed with insecticide if the larval pressure threatens the viability of the crop.</td>
</tr>
<tr>
<td>Irrigation</td>
<td>The trap crop is to remain attractive to Helicoverpa spp. until after defoliation of cotton. In some cases this may require one additional irrigation after the cotton is defoliated. The trap crop must be planted into an area where it can receive the additional irrigation required to ensure the trap crop remains attractive to Helicoverpa spp.</td>
</tr>
<tr>
<td>Weed control</td>
<td>The trap crop should be kept free of weeds and particularly volunteer Bollgard II cotton.</td>
</tr>
<tr>
<td>Crop destruction</td>
<td>The trap crop must be destroyed 2-4 weeks after defoliation of the Bollgard II cotton crop, but not before 3 weeks (slash and pupae bust – full soil disturbance to a depth of 10 cm across the entire trap crop area). All Bollgard II cotton and associated trap crops must be destroyed by: Burdekin Bowen Basin/Richmond Area – August 31. Ord River Irrigation Area – December 10.</td>
</tr>
</tbody>
</table>

NB: If any grower encounters problems in complying with the resistance management plan, please contact your Monsanto Regional Business Manager.

For further background information on the various components of this plan see the “Preamble to the Resistance Management Plan for Bollgard II” in the current Cotton Pest Management Guide.

ATTACHMENT B

NORTHERN AUSTRALIA RESISTANCE MANAGEMENT PLAN FOR BOLLGARD® 3 COTTON

Developed by Monsanto Australia Limited and the Transgenic and Insect Management Strategy (TIMS) Committee of Cotton Australia Limited.

The resistance management plan is based on three basic principles: (1) minimising the exposure of Helicoverpa spp. to the Bacillus thuringiensis (Bt) proteins Cry 1Ac, Cry 2Ab and Vip3A; (2) providing a population of susceptible individuals that can mate with any resistant individuals, hence diluting any potential resistance; and (3) removing resistant individuals at the end of the cotton season. The three principles are supported through the implementation of 5 elements that are the key components of the Resistance Management Plan. These elements are:

1. Planting Restrictions;
2. Refuge crops;
3. Control of volunteers and ratoon cotton;
4. Trap crops/Pupae destruction; and
5. Spray limitations.

Growers of Bollgard 3 cotton are required to practice preventative resistance management as set out below. Compliance with the Resistance Management Plan is required under the terms of the Bollgard 3 Technology User Agreement and under the conditions of registration (Agricultural and Veterinary Chemicals Act, 1994).

Scope: This RMP pertains to cotton planting in all areas North of the latitude 21.15 degrees south in Queensland, Northern Territory and Western Australia.

1. Planting Restrictions

All Bollgard 3 crops and cotton refuges are to be planted into moisture or watered-up in a six week window between December 1 and May 30. Valley boundaries will be determined by Monsanto and TIMS. Within each valley, the start date of the planting window will be determined by Monsanto and TIMS in consultation with local growers and reflected in a regionally amended “Bollgard 3 Planting Window Variation Notice” issued by Monsanto.

2. Refuges

Growers planting Bollgard 3 cotton will also be required to grow a refuge crop that is capable of producing large numbers of Helicoverpa spp. moths which have not been exposed to selection with Bt proteins Cry 1Ac, Cry 2Ab and Vip3A. These unselected moths are expected to dominate matings with any survivors from Bollgard 3 crops and thus help to maintain resistant alleles to the Bt proteins Cry 1Ac, Cry 2Ab, and Vip3A at low frequencies.

All refuge options are based on the requirement of a 5% unsprayed cotton refuge or its equivalent as determined by the relative production of Helicoverpa spp. from each of the refuge types as described in the table below.

For each area of irrigated Bollgard 3 cotton planted, a grower is required to plant a minimum of one, or a combination of, the following:

Table 1. Irrigated Bollgard 3 cotton refuge options

<table>
<thead>
<tr>
<th>Crop</th>
<th>Conditions</th>
<th>% of Bollgard 3</th>
<th>Regions permitted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional Cotton</td>
<td>Irrigated, unsprayed conventional cotton</td>
<td>5</td>
<td>All Regions</td>
</tr>
<tr>
<td>Pigeon pea</td>
<td>Fully irrigated, unsprayed</td>
<td>2.5</td>
<td>All Regions</td>
</tr>
</tbody>
</table>
Table 2. End of season chick pea trap crop requirements

<table>
<thead>
<tr>
<th>Criterion</th>
<th>End of season chick pea trap crop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum area &amp; dimensions</td>
<td>A trap crop of 1% of planted Bollgard II crop area is required. This planting must be at least 24 m x 24m wide.</td>
</tr>
<tr>
<td>Planting time</td>
<td>In April for Burdekin Bowen Area. In July/August for Ord area. The trap crop is to be planted such that it is attractive to Helicoverpa spp. from 2 weeks before defoliation of the Bollgard II cotton. It must remain attractive to Helicoverpa spp. until at least 2 weeks after defoliation of the Bollgard II cotton.</td>
</tr>
<tr>
<td>Insect control</td>
<td>The trap crop should be monitored and sprayed with insecticide if the larval pressure threatens the viability of the crop.</td>
</tr>
<tr>
<td>Irrigation</td>
<td>The trap crop is to remain attractive to Helicoverpa spp. until after defoliation of cotton. In some cases this may require one additional irrigation after the cotton is defoliated. The trap crop must be planted into an area where it can receive the additional irrigation required to ensure the trap crop remains attractive to Helicoverpa spp.</td>
</tr>
<tr>
<td>Weed control</td>
<td>The trap crop should be kept free of weeds and particularly volunteer Bollgard II cotton.</td>
</tr>
<tr>
<td>Crop destruction</td>
<td>The trap crop must be destroyed 2-4 weeks after defoliation of the Bollgard II cotton crop, but not before 3 weeks (slash and pupae bust – full soil disturbance to a depth of 10 cm across the entire trap crop area). All Bollgard II cotton and associated trap crops must be destroyed by: Burdekin Bowen Basin/Richmond Area – August 31 Ord River Irrigation Area – December 10</td>
</tr>
</tbody>
</table>

NB: If any grower encounters problems in complying with the resistance management plan, please contact your Monsanto Regional Business Manager.

For further background information on the various components of this plan see the “Preamble to the Resistance Management Plan for Bollgard II” in the current Cotton Pest Management Guide.

Table 1. Irrigated Bollgard 3 cotton refuge options

<table>
<thead>
<tr>
<th>Crop</th>
<th>Conditions</th>
<th>% of Bollgard 3</th>
<th>Regions permitted</th>
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</thead>
<tbody>
<tr>
<td>Conventional Cotton</td>
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<td>5</td>
<td>All Regions</td>
</tr>
<tr>
<td>Pigeon pea</td>
<td>Fully irrigated, unsprayed</td>
<td>2.5</td>
<td>All Regions</td>
</tr>
</tbody>
</table>

NORTHERN AUSTRALIA RESISTANCE MANAGEMENT PLAN FOR BOLLGARD® 3 COTTON

Developed by Monsanto Australia Limited and the Transgenic and Insect Management Strategy (TIMS) Committee of Cotton Australia Limited.

The resistance management plan is based on three basic principles: (1) minimising the exposure of Helicoverpa spp. to the Bacillus thuringiensis (Bt) proteins Cry 1Ac, Cry 2Ab and Vip3A; (2) providing a population of susceptible individuals that can mate with any resistant individuals, hence diluting any potential resistance; and (3) removing resistant individuals at the end of the cotton season. The three principles are supported through the implementation of 5 elements that are the key components of the Resistance Management Plan. These elements are:

1. Planting Restrictions;
2. Refuge crops;
3. Control of volunteers and ratoon cotton;
4. Trap crops/Pupae destruction; and
5. Spray limitations.

Growers of Bollgard 3 cotton are required to practice preventative resistance management as set out below. Compliance with the Resistance Management Plan is required under the terms of the Bollgard 3 Technology User Agreement and under the conditions of registration (Agricultural and Veterinary Chemicals Act, 1994).

Scope: This RMP pertains to cotton planting in all areas North of the latitude 21.15 degrees south in Queensland, Northern Territory and Western Australia.

1. Planting Restrictions

All Bollgard 3 crops and cotton refuges are to be planted into moisture or watered-up in a six week window between December 1 and May 30. Valley boundaries will be determined by Monsanto and TIMS. Within each valley, the start date of the planting window will be determined by Monsanto and TIMS in consultation with local growers and reflected in a regionally amended “Bollgard 3 Planting Window Variation Notice” issued by Monsanto.

2. Refuges

Growers planting Bollgard 3 cotton will also be required to grow a refuge crop that is capable of producing large numbers of Helicoverpa spp. moths which have not been exposed to selection with Bt proteins Cry 1Ac, Cry 2Ab and Vip3A. These unselected moths are expected to dominate matings with any survivors from Bollgard 3 crops and thus help to maintain resistant alleles to the Bt proteins Cry 1Ac, Cry 2Ab, and Vip3A at low frequencies.

All refuge options are based on the requirement of a 5% unsprayed cotton refuge or its equivalent as determined by the relative production of Helicoverpa spp. from each of the refuge types as described in the table below.

For each area of irrigated Bollgard 3 cotton planted, a grower is required to plant a minimum of one, or a combination of, the following:
Table 2. Dryland Bollgard 3 refuge options

<table>
<thead>
<tr>
<th>Crop</th>
<th>Conditions</th>
<th>% of Bollgard 3</th>
<th>Regions permitted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional Cotton</td>
<td>Dryland or irrigated, unsprayed conventional cotton</td>
<td>5</td>
<td>All Regions</td>
</tr>
<tr>
<td>Pigeon pea</td>
<td>Dryland or fully irrigated, unsprayed</td>
<td>2.5</td>
<td>All Regions</td>
</tr>
</tbody>
</table>

Notes: Unsprayed means not sprayed with insecticides that target any life stage of Helicoverpa spp.

Unsprayed means not sprayed with any insecticide that targets any life stage of Helicoverpa spp.

Bt products must not be applied to any refuge.

If the viability of an unsprayed refuge is at risk due to early or late season pressure by Helicoverpa spp., any other caterpillar species, contact Monsanto Australia immediately. With prior approval from Monsanto Australia, a non-Bt larvicide can be applied.

An unsprayed refuge should not be planted in the same field as any crop sprayed with a rate of insecticide that is registered for Helicoverpa spp., with the exception of Bollgard 3 unless a sufficient buffer is in place to prevent insecticide drift.

Sprayed crops and unsprayed refuges that are planted in adjacent fields must also be separated by sufficient distance to minimise the likelihood of insecticide drift onto the unsprayed refuge.

For the purposes of this Resistance Management Plan, conventional cotton includes any cotton varieties that do not have Bt proteins in the plant that control Helicoverpa spp. larvae.

General conditions for all refuges:

(a) Refuge crops are to be planted and managed so that they are attractive to Helicoverpa spp. during the growing period of the Bollgard 3 cotton varieties.

(b) Group J legume inoculant should be used to treat pigeon pea planting seed just prior to sowing to ensure effective root nodule colonisation by nitrogen fixing Rhizobium bacteria.

(c) All refuges should preferably be planted into a fallow or rotation field that has not been planted to Bt cotton in the previous season to avoid volunteer and ratoon cotton. See Refuge Management Guide for all unsprayed refuges.

(d) Once the Bollgard 3 cotton begins to flower the corresponding refuge must not be cultivated.

(e) Insecticide preparations containing Bt may be used on Bollgard 3 cotton throughout the season BUT NOT on any refuge crops.

(f) All refuges are to be planted within the farm unit growing Bollgard 3 cotton. Subject to clause (b) below, all reasonable effort should be taken to plant the refuge either on one side of, or next to, a Bollgard 3 cotton field, and all Bollgard 3 fields must be more than 2 km from the nearest Bollgard 3 refuge. For any cases where it may not be possible to plant the refuge within 2 km from the associated Bollgard 3, approval must be sought from Monsanto.

(g) To minimise the possibility of refuge attractiveness being affected by herbicide drift, non-herbicide tolerant refuges should be separated from herbicide tolerant Bollgard 3 cotton crops by a sufficient distance to minimise such drift, but no more than 2 km from the Bollgard 3 cotton.

(h) To account for possible insecticide drift, Bollgard 3 refuge crops must be at least 24 metres wide and each refuge area must be a minimum of 0.5 hectares. Different unsprayed refuge options may be planted in the same field as a single unit.

(i) Destruction of refuges must only be carried out after the Bollgard 3 has been harvested. Soil disturbance of refuge crops must only occur when the trap crop is being destroyed (refer to section 4.2 Trap crop).

(j) Refuges for Bollgard 3 crops must be planted in the same row configuration as the Bollgard 3 crop.

3. Control of volunteer and ratoon cotton

Volunteer and ratoon cotton may impose additional selection pressure on Helicoverpa spp. to develop resistance to the Bt proteins Cry 1Ac, Cry 2Ab and Vip3A produced by Bollgard 3 cotton.

As soon as practical after harvest, Bollgard 3 cotton crops must be destroyed by cultivation, root cutting or herbicide so that they do not continue to act as hosts for Helicoverpa spp.

Growers must make all reasonable efforts to remove volunteer and ratoon plants as soon as possible from all fields - including fallow areas, Bollgard 3 crops, conventional cotton crops and all refuges.

The presence of Bollgard 3 volunteers/ratoon cotton in any refuge will diminish the value of the refuge and must be removed as soon as possible.

Note: The refuge should preferably be planted into fallow or rotation fields that have not been planted to cotton in the previous season.

4. End of season pigeon pea trap crop

An end of season pigeon pea trap crop must be planted. The planting configuration of the trap crop should be the same as that of the Bollgard 3 crop. Table 3 shows the requirements for the pigeon pea trap crop.

CROP DESTRUCTION

All Bollgard 3 crops must be slashed or mulched and controlled to prevent regrowth within 4 weeks of harvesting.

End of season management of refuges/trap crops

A late summer cotton crop (pigeon pea) must be planted for all Bollgard 3 cotton grown in Northern Australia. The planting configuration of the trap crop should be the same as that of the Bollgard 3 crop. Irrigated Bollgard 3 must have an irrigated trap crop. Table 3 shows the requirements for the late summer pigeon pea trap crop. Dryland Bollgard 3 growers who do not have any irrigated cotton on their farm should contact Monsanto Australia for alternative options.

Refuge and late summer trap crops have different purposes. Where a pigeon pea refuge is utilised, the full pigeon pea refuge area must be managed to become the late summer trap crop. If unsprayed cotton is used as the refuge, an additional area of 1% pigeon pea must be planted as the late summer trap crop. Requirements for late summer trap crops are detailed in Table 3 below.

Table 3: Late summer pigeon pea trap crop requirements in Northern Australia

<table>
<thead>
<tr>
<th>CRITERION</th>
<th>TRAP CROP*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum area</td>
<td>A minimum trap crop of 1% of planted Bollgard 3 cotton crop is required (if the full refuge is not utilised). If sprayed conventional cotton is grown on that farm unit: the trap crop must be at least 48m x 48m. If no sprayed conventional cotton is grown on that farm unit: the trap crop must be at least 24m x 24m.</td>
</tr>
</tbody>
</table>

Planting time

The trap crop should preferably be planted 4 weeks after the associated Bollgard 3. Note: if growers choose to plant their trap crop to coincide with the planting of pigeon pea refuges, they must manage the trap crop in such a way that it remains attractive to Helicoverpa spp. 2-4 weeks after final defoliation.

Planting rate **

35kg/ha [recommended establishment greater than 4 plants per metre]
Table 2. Dryland Bollgard 3 refuge options

<table>
<thead>
<tr>
<th>Crop</th>
<th>Conditions</th>
<th>% of Bollgard 3</th>
<th>Regions permitted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional Cotton</td>
<td>Dryland or irrigated, unsprayed conventional cotton</td>
<td>5</td>
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Notes: Unsprayed means not sprayed with insecticides that target any life stage of Helicoverpa spp.

Unsprayed means not sprayed with any insecticide that targets any life stage of Helicoverpa spp.

Bt products must not be applied to any refuge.

If the viability of an unsprayed refuge is at risk due to early or late season pressure by Helicoverpa spp., or any other caterpillar species, contact Monsanto Australia immediately. With prior approval from Monsanto Australia, a non-Bt larvicide can be applied.

An unsprayed refuge should not be planted in the same field as any crop sprayed with a rate of insecticide that is registered for Helicoverpa spp., with the exception of Bollgard 3 unless a sufficient buffer is in place to prevent insecticide drift.

Sprayed crops and unsprayed refuges that are planted in adjacent fields must also be separated by sufficient distance to minimise the likelihood of insecticide drift onto the unsprayed refuge.

For the purposes of this Resistance Management Plan, conventional cotton includes any cotton varieties that do not have Bt proteins in the plant that control Helicoverpa spp. larvae.

General conditions for all refuges:

a) Refuge crops are to be planted and managed so that they are attractive to Helicoverpa spp. during the growing period of the Bollgard 3 cotton varieties.

   All regions: It is preferable that all refuge is planted within the 2 week period prior to planting Bollgard 3. If this is not possible, refuge planting must be completed within 3 weeks of the first day of sowing of Bollgard 3. At this time, sufficient refuge must have been planted to cover all of the Bollgard 3 cotton proposed to be planted for the season (including Bollgard 3 already planted and any that remains unplanted). Should additional Bollgard 3 be planted after this date, which is not already covered by refuge, additional refuge must be planted as soon as possible and no more than 2 weeks after sowing of the additional Bollgard 3.

b) Group J legume inoculant should be used to treat pigeon pea planting seed just prior to sowing to ensure effective root zone colonisation by nitrogen-fixing Rhizobium bacteria.

c) All refuges should preferably be planted in a baffle or rotation field that has not been planted to Bt cotton in the previous season to avoid volunteer and ratoon cotton. See Refuge Management Guide for all unsprayed refuges.

d) Once the Bollgard 3 cotton begins to flower the corresponding refuge must not be cultivated.

e) Insecticide preparations containing Bt may be used on Bollgard 3 cotton throughout the season BUT NOT on any refuge crops.

f) All refuges are to be planted within the farm unit growing Bollgard 3 cotton. Subject to clause (f) below, all reasonable effort should be taken to plant the refuge either on one side of, or next to, a Bollgard 3 cotton field, and all Bollgard 3 fields must be at least 2km from the nearest Bollgard 3 refuge. For any cases where it may not be possible to plant the refuge within 2km from the associated Bollgard 3, approval must be sought from Monsanto.

g) To minimise the possibility of refuge attractiveness being affected by herbicide drift, non-herbicide tolerant refuges should be separated from herbicide tolerant Bollgard 3 cotton crops by a sufficient distance to minimise such drift, but no more than 2km from the Bollgard 3 cotton.

h) To account for possible insecticide drift, Bollgard 3 refuge crops must be at least 24 metres wide and each refuge area must be a minimum of 0.5 hectares. Different unsprayed refuge options may be planted in the same field as a single unit.

i) Destruction of refuges must only be carried out after the Bollgard 3 has been harvested. Soil disturbance of refuge crops must only occur when the trap crop is being destroyed (refer to section 4 Trap crop).

j) Refuge for Bollgard 3 crops must be planted in the same row configuration as the Bollgard 3 crop.

3. Control of volunteer and ratoon cotton

Volunteer and ratoon cotton may impose additional selection pressure on Helicoverpa spp. to develop resistance to the Bt proteins Cry 1Ac, Cry 2Ab and Vip3A produced by Bollgard 3 cotton.

As soon as practical after harvest, Bollgard 3 cotton crops must be destroyed by cultivation, root cutting or herbicide so that they do not continue to act as hosts for Helicoverpa spp.

Growers must make all reasonable efforts to remove volunteer and ratoon plants as soon as possible from all fields - including fallow areas, Bollgard 3 crops, conventional cotton crops and all refuges. The presence of Bollgard 3 volunteers/ratoon cotton in any refuge will diminish the value of the refuge and must be removed as soon as possible.

Note: The refuge should preferably be planted into fallow or rotation fields that have not been planted to cotton in the previous season.

4. End of season pigeon pea trap crop

An end of season pigeon pea trap crop must be planted. The planting configuration of the trap crop should be the same as that of the Bollgard 3 crop. Table 3 shows the requirements for the pigeon pea trap crop.

Crop destruction

All Bollgard 3 crops must be slashed or mulched and controlled to prevent regrowth within 4 weeks of harvesting.

End of season management of refuges/trap crops

A late summer trap crop (pigeon pea) must be planted for all Bollgard 3 cotton grown in Northern Australia. The planting configuration of the trap crop should be the same as that of the Bollgard 3 crop. Irrigated Bollgard 3 must have an irrigated trap crop. Table 3 shows the requirements for the late summer pigeon pea trap crop. Dryland Bollgard 3 growers who do not have any irrigated cotton on their farm should contact Monsanto Australia for alternative options.

Refuge and late summer trap crops have different purposes. Where a pigeon pea refuge is utilised, the full pigeon pea refuge area must be managed to become the late summer trap crop. If unsprayed cotton is used as the refuge, an additional area of 1% pigeon pea must be planted as the late summer trap crop. Requirements for late summer trap crops are detailed in Table 3 below.

Table 3: Late summer pigeon pea trap crop requirements in Northern Australia

<table>
<thead>
<tr>
<th>CRITERION</th>
<th>TRAP CROP*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum area &amp; dimension (Requirement)</td>
<td>A minimum trap crop of 1% of planted Bollgard 3 cotton crop is required (if the full refuge is not utilised).</td>
</tr>
<tr>
<td>If sprayed conventional cotton is grown on that farm unit: the trap crop must be at least 48m x 48m.</td>
<td>If no sprayed conventional cotton is grown on that farm unit: the trap crop must be at least 24m x 24m.</td>
</tr>
<tr>
<td>Planting time</td>
<td>The trap crop should preferably be planted 4 weeks after the associated Bollgard 3. Note: if growers choose to plant their trap crop to coincide with the planting of pigeon pea refuges, they must manage the trap crop in such a way that it remains attractive to Helicoverpa spp. 2-4 weeks after final defoliation.</td>
</tr>
<tr>
<td>Planting rate **</td>
<td>35kg/ha [recommended establishment greater than 4 plants per metre]</td>
</tr>
</tbody>
</table>
Insect control
The trap crop can be sprayed with virus after flowering, while avoiding insecticide spray drift, except where a pigeon pea refuge is converted to a trap crop. In this case the full 5% pigeon pea refuge area managed to become the late summer trap crop can only be sprayed with virus after the first defoliation of Bollgard 3 cotton.

Irrigation
The refuge/trap crop must be planted into an area where it can receive the additional irrigation required to keep the trap crop attractive to Helicoverpa spp. until after the cotton is defoliated.

Weed control
The trap crop should be kept free of weeds and particularly volunteer Bollgard 3 cotton. When using the full pigeon pea refuge area as the trap crop, weed control must not be carried out by cultivation once flowering of the associated Bollgard 3 cotton crop has commenced.

Crop destruction
The trap crop must be destroyed 2-4 weeks (but not before 2 weeks) after final defoliation of the associated Bollgard 3 cotton crop, (slash and pupae bust – full soil disturbance to a depth of 10 cm across the entire trap crop area).

**The planting rate is a recommendation based on a minimum of 85% seed germination.

An unsprayed refuge should not be planted in the same field as any crop sprayed with a rate of insecticide that is registered for refuge crops.

If the viability of an unsprayed refuge is at risk due to early or late season pressure by Helicoverpa spp., or any other caterpillar species, contact Monsanto Australia immediately. With prior approval from Monsanto Australia, a non-Bt larvicide can be applied. Insecticide preparations containing Bt may be used on Bollgard 3 cotton throughout the season BUT NOT on any pigeon pea refuge area managed to become the late summer trap crop.

If any grower encounters problems in complying with the Resistance Management Plan please contact Monsanto Australia.

For further background information on the various components of this plan see the “Preamble to the Resistance Management Plan for Bollgard 3” in the current Cotton Pest Management Guide.

5. Spray Limitations

Insecticide preparations containing Bt may be used on Bollgard 3 cotton throughout the season BUT NOT on any refuge crops. An unsprayed refuge should not be planted in the same field as any crop sprayed with a rate of insecticide that is registered for Helicoverpa spp. with the exception of Bollgard 3. Sprayed crops and unsprayed refuges that are planted in adjacent fields must be separated by sufficient distance to minimise the likelihood of insecticide drift onto the unsprayed refuge.

If the viability of an unsprayed refuge is at risk due to early or late season pressure by Helicoverpa spp., or any other caterpillar species, contact Monsanto Australia immediately. With prior approval from Monsanto Australia, a non-Bt larvicide can be applied.

NB: If any grower encounters problems in complying with the Resistance Management Plan please contact Monsanto Australia.

For further background information on the various components of this plan see the “Preamble to the Resistance Management Plan for Bollgard 3” in the current Cotton Pest Management Guide.

**The planting rate is a recommendation based on a minimum of 85% seed germination.

5. Spray Limitations

5.1 Insecticide Limitations

The planting rate is a recommendation based on a minimum of 85% seed germination.

Insects
Insects can be controlled with insecticides registered for Bollgard cotton. A non-Bt larvicide can be used on Bollgard cotton, with prior approval from Monsanto Australia. Insecticides containing Bt may not be used on Bollgard cotton.

5.2 Weed Control

Weeds can be controlled with herbicides registered for Bollgard cotton. Herbicides containing glyphosate should not be used on Bollgard cotton.

5.3 Crop Destruction

The trap crop must be destroyed 2-4 weeks (but not before 2 weeks) after final defoliation of the associated Bollgard 3 cotton crop. Slash and pupae bust – full soil disturbance to a depth of 10 cm across the entire trap crop area.

5.4 Irrigation

The refuge/trap crop must be planted into an area where it can receive the additional irrigation required to keep the trap crop attractive to Helicoverpa spp. until after the cotton is defoliated.

5.5 Weed Control

The trap crop should be kept free of weeds and particularly volunteer Bollgard 3 cotton. When using the full pigeon pea refuge area as the trap crop, weed control must not be carried out by cultivation once flowering of the associated Bollgard 3 cotton crop has commenced.

5.6 Crop Destruction

The trap crop must be destroyed 2-4 weeks (but not before 2 weeks) after final defoliation of the associated Bollgard 3 cotton crop. Slash and pupae bust – full soil disturbance to a depth of 10 cm across the entire trap crop area.

6.1 Insecticide Limitations

6.1.1 Insecticides

Insecticides can be used to control insects on Bollgard cotton. However, insecticides containing Bt may not be used on Bollgard cotton.

6.1.2 Weed Control

Weeds can be controlled with herbicides registered for Bollgard cotton. Herbicides containing glyphosate should not be used on Bollgard cotton.

6.2 Crop Destruction

The trap crop must be destroyed 2-4 weeks (but not before 2 weeks) after final defoliation of the associated Bollgard 3 cotton crop. Slash and pupae bust – full soil disturbance to a depth of 10 cm across the entire trap crop area.

6.3 Irrigation

The refuge/trap crop must be planted into an area where it can receive the additional irrigation required to keep the trap crop attractive to Helicoverpa spp. until after the cotton is defoliated.

6.4 Weed Control

The trap crop should be kept free of weeds and particularly volunteer Bollgard 3 cotton. When using the full pigeon pea refuge area as the trap crop, weed control must not be carried out by cultivation once flowering of the associated Bollgard 3 cotton crop has commenced.

6.5 Crop Destruction

The trap crop must be destroyed 2-4 weeks (but not before 2 weeks) after final defoliation of the associated Bollgard 3 cotton crop. Slash and pupae bust – full soil disturbance to a depth of 10 cm across the entire trap crop area.

6.6 Irrigation

The refuge/trap crop must be planted into an area where it can receive the additional irrigation required to keep the trap crop attractive to Helicoverpa spp. until after the cotton is defoliated.

6.7 Weed Control

The trap crop should be kept free of weeds and particularly volunteer Bollgard 3 cotton. When using the full pigeon pea refuge area as the trap crop, weed control must not be carried out by cultivation once flowering of the associated Bollgard 3 cotton crop has commenced.

6.8 Crop Destruction

The trap crop must be destroyed 2-4 weeks (but not before 2 weeks) after final defoliation of the associated Bollgard 3 cotton crop. Slash and pupae bust – full soil disturbance to a depth of 10 cm across the entire trap crop area.

6.9 Irrigation

The refuge/trap crop must be planted into an area where it can receive the additional irrigation required to keep the trap crop attractive to Helicoverpa spp. until after the cotton is defoliated.

6.10 Weed Control

The trap crop should be kept free of weeds and particularly volunteer Bollgard 3 cotton. When using the full pigeon pea refuge area as the trap crop, weed control must not be carried out by cultivation once flowering of the associated Bollgard 3 cotton crop has commenced.

6.11 Crop Destruction

The trap crop must be destroyed 2-4 weeks (but not before 2 weeks) after final defoliation of the associated Bollgard 3 cotton crop. Slash and pupae bust – full soil disturbance to a depth of 10 cm across the entire trap crop area.

7. Managing Roundup Ready Flex Cotton

7.1 Managing Roundup Ready Flex Cotton

Managing Roundup Ready Flex Cotton

The Roundup Ready Flex cotton Weed Resistance Management Plan (WRMP) details strategies that can be implemented to minimise the risk of glyphosate resistance developing in weeds on-farm. It complements the Roundup Ready Flex accreditation course and technical manual. Roundup Ready Flex cotton offers superior and effective weed control to growers, with a wide glyphosate application window, outstanding crop safety, broad spectrum weed control and the ability to control weeds where they appear. The flexibility of an Integrated Weed Management (IWM) strategy, including Roundup Ready Flex cotton, offers management efficiencies as well as a variety of in-crop weed control options. Prudent management of Roundup Ready Flex technology and mitigation of resistance risks will ensure these options for weed control are available to Australian cotton growers well into the future.

7.2 Growing Roundup Ready Flex Cotton

Growing Roundup Ready Flex Cotton

There are several requirements that growers need to be aware of when planting Roundup Ready Flex, as outlined by the Technology User Agreement (TUA) and the product labels for Roundup Ready® Herbicide with PLANTSIELD® and Roundup Ready® PL Herbicide with PLANTSIELD® Technology.

These requirements are designed to promote the longevity of the trait and herbicides and include:

- Completion of a Roundup Ready Flex accreditation course prior to planting the trait for the first time
- Reporting any suspected glyphosate resistant weed species to a Bayer representative
- Implementing an IWM strategy

Growers should make sure they familiarise themselves with both the TUA terms and conditions and the relevant glyphosate product labels.

7.3 Protecting an important tool – glyphosate

Protecting an important tool – glyphosate

Herbicide resistant weeds have been a reality for decades in Australia – no herbicide is immune, including glyphosate. While the problem is significant, it is also manageable and effective mitigation strategies can reduce the risk and delay its development. In Australia, glyphosate resistant populations of several weed species have been found, including some throughout the cotton growing regions. Glyphosate is a critically important part of any IWM program on cotton farms, and growers want to make sure that the benefits it delivers are preserved and maintained. Where glyphosate resistance has occurred, it can be effectively managed through good agronomic practices. There are actions that every grower can take to prevent or manage glyphosate resistance on their property. By acting now, we can ensure the long-term sustainable use of glyphosate herbicides in cotton crops, by minimising the risk of glyphosate resistance developing.

Naturally occurring populations of some weeds may possess biotypes with resistance to glyphosate. Growers should be aware of this prior to using glyphosate and should aim to decrease the development and spread of resistant populations. If you suspect resistant biotypes are present, they should be sampled and tested. Contact the local Bayer Regional Business Manager for assistance with this process.

The WRMP aims to reduce the likelihood of glyphosate resistance developing, it does not, guarantee that resistance will not occur.

7.4 Understanding your glyphosate resistance risk

Understanding your glyphosate resistance risk

Each field planted to Roundup Ready Flex cotton has its own unique risk of glyphosate resistance developing, based on its usage history, the weeds present and their density, and other historical rotations and agronomic management strategies employed.

As a part of any sound IWM plan, growers are encouraged to assess their resistance risk prior to planting Roundup Ready Flex cotton.
**Insect control**
The trap crop can be sprayed with virus after flowering, while avoiding insecticide spray drift, except where a pigeon pea refuge is converted to a trap crop. In this case the full 5% pigeon pea refuge area managed to become the late summer trap crop can only be sprayed with virus after the first defoliation of Bollgard 3 cotton.

**Irrigation**
The refuge/trap crop must be kept free of weeds and particularly volunteer Bollgard 3 cotton. When using the full pigeon pea refuge area as the trap crop, weed control must not be carried out by cultivation once flowering of the associated Bollgard 3 cotton crop has commenced.

**Weed control**
The trap crop should be kept free of weeds and particularly volunteer Bollgard 3 cotton. Weed control can be carried out by cultivation once flowering of the associated Bollgard 3 cotton crop has commenced.

**Crop destruction**
The trap crop must be destroyed 2-4 weeks (but not before 2 weeks) after final defoliation of the associated Bollgard 3 cotton crop, as any survivors from the Bollgard 3 crop emerge. Planting pigeon pea too early (e.g. before November) or too late (e.g. mid December) is not adequate for cotton crops planted during September through to October.

*Pigeon pea trap crop is to be planted so that it is attractive (flowering) to Helicoverpa spp. after the cotton crop has cut out, and as any survivors from the Bollgard 3 crop emerge. Planting pigeon pea too early (e.g. before November) or too late (e.g. mid December) is not adequate for cotton crops planted during September through to October.

**5. Spray Limitations**

Insecticide preparations containing Bt may be used on Bollgard 3 cotton throughout the season BUT NOT on any refuge crops.

An unsprayed refuge should not be planted in the same field as any crop sprayed with a rate of insecticide that is registered for Helicoverpa spp. with the exception of Bollgard 3. Sprayed crops and unsprayed refuges that are planted in adjacent fields must be separated by sufficient distance to minimise the likelihood of insecticide drift onto the unsprayed refuge.

If the viability of an unsprayed refuge is at risk due to early or late season pressure by Helicoverpa spp., or any other caterpillar species, contact Monsanto Australia immediately. With prior approval from Monsanto Australia, a non-Bt larvicide can be applied.

NB: If any grower encounters problems in complying with the Resistance Management Plan please contact Monsanto Australia.

For further background information on the various components of this plan see the “Preamble to the Resistance Management Plan for Bollgard 3” in the current Cotton Pest Management Guide.

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ROUNDUP READY FLEX® COTTON
WEED RESISTANCE MANAGEMENT PLAN (WRMP)

1. **Objective**
The Roundup Ready Flex cotton Weed Resistance Management Plan (WRMP) details strategies that can be implemented to minimise the risk of glyphosate resistance developing in weeds on-farm. It complements the Roundup Ready Flex accreditation course and technical manual. Roundup Ready Flex cotton offers superior and effective weed control to growers, with a wide glyphosate application window, outstanding crop safety, broad spectrum weed control, and the ability to control weeds where they appear. The flexibility of an Integrated Weed Management (IWM) strategy, including Roundup Ready Flex cotton, offers management efficiencies as well as a variety of off-crop weed control options. Prudent management of Roundup Ready Flex technology and mitigation of resistance risks will ensure these options for weed control are available to Australian cotton growers well into the future.

2. **Growing Roundup Ready Flex® cotton**

There are several requirements that growers need to be aware of when planting Roundup Ready Flex, as outlined by the Technology User Agreement (TUA) and the product labels for Roundup Ready® Herbicide with PLANTSHEILD® and Roundup Ready® PL Herbicide with PLANTSHEILD® Technology.

These requirements are designed to promote the longevity of the trait and herbicides and include:

- Completion of a Roundup Ready Flex accreditation course prior to planting the trait for the first time
- Reporting any suspected glyphosate resistant weed species to a Bayer representative
- Implementing an IWM strategy

Growers should make sure they familiarise themselves with both the TUA terms and conditions and the relevant glyphosate product labels.

3. **Protecting an important tool – glyphosate**

Herbicide resistant weeds have been a reality for decades in Australia – no herbicide is immune, including glyphosate.

While the problem is significant, it is also manageable and effective mitigation strategies can reduce the risk and delay its development. In Australia, glyphosate-resistant populations of several weed species have been found, including some throughout the cotton growing regions. Glyphosate is a critically important part of any IWM program on cotton farms, and growers want to make sure that the benefits it delivers are preserved and maintained. Where glyphosate resistance has occurred, it can be effectively managed through good agronomic practices. There are actions that every grower can take to prevent or manage glyphosate resistance on their property. By acting now, we can ensure the long-term sustainable use of glyphosate herbicides in cotton crops, by minimising the risk of glyphosate resistance developing.

Naturally occurring populations of some weeds may possess biotypes with resistance to glyphosate. Growers should be aware of this prior to using glyphosate and should aim to decrease the development and spread of resistant populations. If you suspect resistant biotypes are present, they should be sampled and tested. Contact the local Bayer Regional Business Manager for assistance with this process.

The WRMP aims to reduce the likelihood of glyphosate resistance developing, it does not, guarantee that resistance will not occur.

4. **Understanding your glyphosate resistance risk**

Each field planted to Roundup Ready Flex cotton has its own unique risk of glyphosate resistance developing, based on its usage history, the weeds present and their density, and other historical rotations and agronomic management strategies employed.

As a part of any sound IWM plan, growers are encouraged to assess their resistance risk prior to planting Roundup...
6. Resistance management principles for Roundup Ready Flex® cotton

As outlined in the Roundup Ready Herbicide with PLANTSHIELD and Roundup Ready PL Herbicide with PLANTSHIELD Technology labels, there are some guidelines for designing a successful IWM strategy. The implementation of these principles should result in the reduction in the weed population entering the Roundup Ready Flex cotton cropping phase and maximise the control of weeds that may be resistant to glyphosate. These are:

(a) Aim to enter the Roundup Ready Flex cropping phase of your rotation with a low weed burden
(b) Integrate as many different weed control options as possible through all phases of the crop rotation
(c) Make every herbicide application count – use registered rates at the correct application growth stage and always assess its effectiveness
(d) Rotate herbicides with different modes of action throughout the crop rotation
(e) Regularly monitor the effectiveness of resistance management practices
(f) Test weed populations for herbicide resistance status as part of ongoing IWM
(g) If planting into a paddock with suspected glyphosate resistance growers must have a plan to manage such weeds

The simplest and most effective way to minimise the risk of resistance developing in a Roundup Ready Flex cotton crop is to rotate away from glyphosate immediately following the Roundup Ready Flex cotton crop. Preventing seed set from any weeds surviving glyphosate application is critical to preventing resistance development and spread – never use the same technique twice on the same weed, or weeds growing from seed produced by a surviving weed.

The following table outlines some key principles for weed control at different stages through the cotton season. For more information about any of these recommendations, see the Roundup Ready Flex cotton technical manual.

Pre-plant knockdown
- Always start clean by planting into a weed-free field using either tillage or a herbicide application
- Know your field history in order to identify whether any volunteer cotton present is Roundup Ready Flex
- Consider using approved tank mixes with Roundup Ready Herbicide with PLANTSHIELD and Roundup Ready PL Herbicide with PLANTSHIELD Technology or other registered products as part of an IWM strategy

Residual herbicides
- Residual herbicides should be used where appropriate in a Roundup Ready Flex system
- Consider using residual herbicides where weeds not controlled by Roundup Ready Herbicide with PLANTSHIELD and Roundup Ready PL Herbicide with PLANTSHIELD Technology are present
- The residual herbicide can be applied as a pre-emergence application (either a pre-plant incorporated application, or at planting application)
- Use the recommended labelled rate and timing of the residual herbicide

In-crop weed control
- Target the first application of Roundup Ready Herbicide with PLANTSHIELD or Roundup Ready PL Herbicide with PLANTSHIELD Technology on young cotton with weeds less than 6cm in size
- Sequential applications may be required to control new and subsequent germinations of weeds
- Select the timing of sprays based on the most difficult to control weed species in each field
- Post-directed sprays should be used to achieve more thorough coverage on weeds
- Refer to the ‘Weeds Controlled’ table in the Roundup Ready Herbicide with PLANTSHIELD and Roundup Ready PL Herbicide with PLANTSHIELD Technology labels for rate recommendations on specific weeds
- Be aware of any potential contamination of spray application equipment (including mixing stations)
- Ensure all equipment is thoroughly cleaned and free of residues
- Only tank-mix registered products
- Ensure all applications are made according to label guidelines on water volume, droplet size and environmental conditions
- Be aware of off-target drift to susceptible crops and fields with both aerial and ground applications
- Growers should use registered non-glyphosate in-crop herbicides where required to increase diversity of weed control tactics

Lay-by applications
- If you currently use lay-by herbicides, then consider maintaining this program
- A robust lay-by program can provide residual control of weeds not controlled by Roundup Ready Herbicide with PLANTSHIELD and Roundup Ready PL Herbicide with PLANTSHIELD Technology
- Use the recommended label rate and timing of the residual herbicide

Pre-harvest application
- Over-the-top application of Roundup Ready Herbicide is available if required before harvest and after cotton reaches 60% open bolls, as one of the 4 applications. Rate: 1.5 kg/ha for Roundup Ready Herbicide with PLANTSHIELD or 1.9 L/ha for Roundup Ready PL Herbicide with PLANTSHIELD Technology
- This application can be used to control late season weeds and improve harvest efficiency
- Compatible with commonly used defoliants (see Roundup Ready Herbicide with PLANTSHIELD and Roundup Ready PL with PLANTSHIELD Technology labels)
- Do not use on crops intended for seed production

Bayer strongly recommends that growers consult an agronomist when designing an IWM strategy for their property. For further resources and information see www.glyphosate-resistance.org.au and www.weedsmart.org.au.
Post-directed sprays should be used to achieve more selective control. Be aware of any potential contamination of spray equipment. Growers should use registered non-glyphosate in-crop residual herbicides in crops and fallows. Refer to the 'Weeds Controlled' table in the Roundup Ready Herbicide Technical Manual for rate recommendations on specific weeds. Low rates of non-residual herbicides are recommended to improve harvest efficiency.

5. On farm factors that change resistance risks

The Australian Glyphosate Sustainability Working Group has developed a guide for sustainable use in northern Australian grain and cotton which describes practices that affect the development of resistance.

Factors that decrease resistance risk
- Monitoring and preventing weed control escapes from set seed
- Planning and implementing an IWM strategy to reduce the weed seed-bank
- Strategic use of alternative knockdown herbicides and tillage in fallows prior to sowing
- Use of alternate herbicide modes of action including residual herbicides in crops and fallows
- Use of a double-knock glyphosate followed by tillage or parapquat (Group L) based products at effective rates
- Applying stewardship plans when growing glyphosate tolerant crops
- Farm hygiene to prevent importing and moving resistant seeds.

Factors that increase resistance risk
- Frequent glyphosate-based chemical fallows
- Continuous reliance on glyphosate as a knockdown prior to sowing
- Inter-row use of glyphosate in grain crops (unregistered)
- Lack of tillage
- Lack of use of alternative herbicide modes of action in fallows and crops
- Allowing survivors of glyphosate applications to set seed
- High weed numbers
- Lack of crop competition on weeds
- Over-reliance on glyphosate tolerant crops as a weed control mechanism

6. Resistance management principles for Roundup Ready Flex® cotton

As outlined in the Roundup Ready Herbicide with PLANTSHIELD and Roundup Ready PL Herbicide with PLANTSHIELD Technology labels, there are some guidelines for designing a successful IWM strategy. The implementation of these principals should result in the reduction in the weed population entering the Roundup Ready Flex cotton cropping phase and maximise the control of weeds that may be resistant to glyphosate. These are:

(a) Aim to enter the Roundup Ready Flex cropping phase of your rotation with a low weed burden
(b) Integrate as many different weed control options as possible through all phases of the crop rotation
(c) Make every herbicide application count – use registered rates at the correct application growth stage and always assess its effectiveness
(d) Rotate herbicides with different modes of action throughout the crop rotation
(e) Regularly monitor the effectiveness of resistance management practices
(f) Test weed populations for herbicide resistance status as a part of ongoing IWM
(g) If planting into a paddock with suspected glyphosate resistant growers must have a plan to manage such weeds

The simplest and most effective way to minimise the risk of resistance developing in a Roundup Ready Flex cotton crop is to rotate away from glyphosate immediately following the Roundup Ready Flex cotton crop. Preventing seed set from any weeds surviving glyphosate application is critical to preventing resistance development and spread – never use the same technique twice on the same weed, or weeds growing from seed produced by a surviving weed. The following table outlines some key principles for weed control at different stages through the cotton season. For more information about any of these recommendations, see the Roundup Ready Flex cotton technical manual.

Pre-plant knockdown
- Always start clean by planting into a weed-free field using either tillage or a herbicide application
- Know your field history in order to identify whether any volunteer cotton present is Roundup Ready Flex
- Consider using approved tank mixes with Roundup Ready Herbicide with PLANTSHIELD and Roundup Ready PL Herbicide with PLANTSHIELD Technology or other registered products as part of an IWM strategy

Residual herbicides
- Residual herbicides should be used where appropriate in a Roundup Ready Flex system
- Consider using residual herbicides where weeds not controlled by Roundup Ready Herbicide with PLANTSHIELD and Roundup Ready PL Herbicide with PLANTSHIELD Technology are present
- The residual herbicide can be applied as a pre-emergence application (either a pre-plant incorporated application, or at planting application)
- Use the recommended labelled rate and timing of the residual herbicide

In-crop weed control
- Target the first application of Roundup Ready Herbicide with PLANTSHIELD or Roundup Ready PL Herbicide with PLANTSHIELD Technology on young cotton with weeds less than 6cm in size
- Sequential applications may be required to control new and subsequent germinations of weeds
- Select the timing of sprays based on the most difficult to control weed species in each field
- Post-directed sprays should be used to achieve more thorough coverage on weeds
- Refer to the ‘Weeds Controlled’ table in the Roundup Ready Herbicide with PLANTSHIELD and Roundup Ready PL Herbicide with PLANTSHIELD Technology labels for rate recommendations on specific weeds
- Be aware of any potential contamination of spray application equipment (including mixing stations)
- Ensure all equipment is thoroughly cleaned and free of residues
- Only tank-mix registered products
- Ensure all applications are made according to label guidelines on water volume, droplet size and environmental conditions
- Be aware of off-target drift to susceptible crops and fields with both aerial and ground applications
- Growers should use registered non-glyphosate in-crop herbicides where required to increase diversity of weed control tactics

Lay-by applications
- If you currently use lay-by herbicides, then consider maintaining this program
- A robust lay-by program can provide residual control of weeds not controlled by Roundup Ready Herbicide with PLANTSHIELD and Roundup Ready PL Herbicide with PLANTSHIELD Technology
- Use the recommended label rate and timing of the residual herbicide

Pre-harvest application
- Over-the-top application of Roundup Ready Herbicide is available if required before harvest and after cotton reaches 60% open bolls, as one of the 4 applications. Rate: 1.5 kg/ha for Roundup Ready Herbicide with PLANTSHIELD or 1.9 L/ha for Roundup Ready PL Herbicide with PLANTSHIELD Technology
- This application can be used to control late season weeds and improve harvest efficiency
- Compatible with commonly used defoliants (see Roundup Ready Herbicide with PLANTSHIELD and Roundup Ready PL with PLANTSHIELD Technology labels)
- Do not use on crops intended for seed production

Bayer strongly recommends that growers consult an agronomist when designing an IWM strategy for their property. For further resources and information see www.glyphosate-resistance.org.au and www.weedsmart.org.au.
7. Monitoring herbicide efficacy

All growers or agronomists should inspect fields between 14 and 28 days after spraying with glyphosate to monitor the effectiveness of the herbicide application. During an inspection, any surviving weeds that are normally susceptible to glyphosate should be identified. The outcomes of any inspection and any remedial application used should be recorded. Any case of suspected resistance should be reported immediately to Bayer for further investigation.

8. What to do if you suspect resistance

If any spray failure of Roundup Ready Herbicide with PLANTSHELD and Roundup Ready PL Herbicide with PLANTSHELD Technology occurs, it is essential to determine the reason. Possible reasons for spray failures may be:

- Resistant weeds
- Poor spray application
- Emergence after a spray application

Any weeds which are suspected to be resistant to glyphosate should be tested to confirm this. Bayer will provide support for any Roundup Ready Flex cotton growers with testing suspected resistant weeds in a Roundup Ready Flex cotton field. Contact your Technology Service Provider (TSP) or Bayer Regional Business Manager for more information.

9. Management of resistant or hard to control weeds

To maximise the effectiveness of in-crop applications of Roundup Ready Herbicide with PLANTSHELD and Roundup Ready PL Herbicide with PLANTSHELD Technology, growers should base the timing of these applications on the growth stage of the most difficult to control weed species present in each field. The “Weeds Controlled” table on the Roundup Ready Herbicide with PLANTSHELD and Roundup Ready PL Herbicide with PLANTSHELD Technology labels lists the weeds which glyphosate will control and rate recommendations on specific weeds. Some “hard to control” weeds will not be controlled by glyphosate and are not listed on the Roundup Ready Herbicide with PLANTSHELD and Roundup Ready PL Herbicide with PLANTSHELD Technology labels. Examples of these are Fleabane (Conyza bonariensis) and Flaxlflowered Rhodes Grass (Chloris virgata Sw). These weeds, where present should be controlled by other means. For information and guidance on their control see the cotton pest management guide (http://crdc.com.au/publications/cotton-pest-management-guide), consult your agronomist or guidelines produced by QDAFF or NSW DPI.

Currently in the Australian cotton growing regions, there are several weeds confirmed as glyphosate resistant, and others at high risk of developing resistance. In addition to the “hard to control” weeds, an IPM strategy should take these weeds into account and special care should be taken to control these weeds and prevent them setting seed.

(a) Glyphosate-resistant grass species

There are currently ten grass weed species where glyphosate resistant populations have been identified:

- Annual ryegrass (Lolium rigidum)
- Awnless barnyard grass (Echinochloa colona)
- Liverseed grass (Urochloa panicoidea)
- Windmill grass (Chloris truncata)
- Great brome grass (Bromus diandrus)
- Red brome grass (Bromus rubens)
- Sweet summer grass (Brachia penuformis. (Sm.) Griseb.)
- Feathertop Rhodes grass (Chloris virgata)
- Winter grass (Poa annua)
- Northern barley grass (Hordeum glaucum)

(b) Glyphosate-resistant broadleaf species

There are currently seven broadleaf weed species where glyphosate resistant populations have been identified:

- Flaxleaf fleabane (Conyza bonariensis)
- Tall fleabane (Conyza sumatrensis)
- Sowthistle (Sonchus oleraceus)
- Prickly lettuce (Lactuca serriola)
- Red radish (Raphanus raphanistrum)
- Trand glossy-trand procumbens)
- Willow-leafed lettuce (Lactuca soligna)

The Australian Glyphosate Sustainability Working Group website houses current information on weed populations that have been declared as resistant. Please consult glyphosatesistance.org.au for further information.

10. WeedSmart

WeedSmart is an initiative that promotes the long-term sustainability of glyphosate and other herbicide use in Australian agriculture. The program provides farmers and agronomists with the latest tools and resources to manage herbicide resistance. Further information on WeedSmart can be found at www.weedsmart.org.au.

APPENDIX A

APVMA APPROVED LABEL FOR BOLLGARD 3

Company Name: MONSANTO AUSTRALIA PTY LTD
Product Name: BOLLGARD 3
APVMA Approval No: 69656/106072

Label Name: BOLLGARD 3
Signal Headings: READ BEFORE OPENING THIS BAG
Constituent Statements: Bacillus thuringiensis subspp. kurstaki delta endotoxins as produced by the Cry1Ac and Cry2Ab genes and their controlling sequences. Bacillus thuringiensis strain AB188 exotoxin as produced by the Vip3Aa gene and its controlling sequence.
Mode of Action: GROUP 11C INSECTICIDE
Statement of Claims: For in-built protection of cotton against the Cotton Bollworm and Native Budworm

Net Contents:
Restraints:
Directions for Use:
DIRECTIONS FOR USE
Cotton containing the Bollgard 3 technology must be grown in accordance with the directions prescribed in the endorsed Resistance Management Plan and with the conditions set out in the current Bollgard 3 Technology User Agreement. Read before planting.

CONTROL OF COTTON BOLLWORM AND NATIVE BUDWORM (HELIOTHIS PESTS)
Cotton containing the Bollgard 3 technology expresses Bacillus thuringiensis subspp. kurstaki delta endotoxins proteins and a Bacillus thuringiensis strain AB188 exotoxin protein for the control of the following Lepidopteran cotton insect pests:
- Cotton Bollworm Helicoverpa armigera
- Native Budworm Helicoverpa punctiger a

Cotton containing the Bollgard 3 technology will provide significant protection of cotton against the Cotton Bollworm and Native Budworm. Supplemental insecticide control may still be required under conditions of high pest pressure or high plant stress to maintain Heliothis populations below economically damaging levels.

Monitor crops regularly and apply insecticide treatments if necessary. Insecticide selection should comply with the Insecticide Resistance Management Strategy for Conventional Cotton for the current year. For optimum efficacy, manage crops and inputs to avoid plant stress. Note that eggs and very small larvae (neonates/first instar) will be observed in the crop, as larvae must feed before being controlled by the Bollgard 3 technology.

The Bollgard 3 technology is not registered to control other pests. Other pests should be monitored and treated using the recommended thresholds.
7. Monitoring herbicide efficacy

All growers or agronomists should inspect fields between 14 and 28 days after spraying with glyphosate to monitor the effectiveness of the herbicide application. During an inspection, any surviving weeds that are normally susceptible to glyphosate should be identified. The outcomes of any inspection and any remedial application used should be recorded. Any case of suspected resistance should be reported immediately to Bayer for further investigation.

8. What to do if you suspect resistance

If any spray failure of Roundup Ready Herbicide with PLANTSHIELD and Roundup Ready PL Herbicide with PLANTSHIELD Technology occurs, it is essential to determine the reason. Possible reasons for spray failures may be:

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9. Management of resistant or hard to control weeds

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- Prickly lettuce (Lactuca serriola)
- Wild radish (Raphanus raphanistrum)
- Tidra daisy (Tidria prociuncula)
- Willow-leaved lettuce (Lactuca soligna)

The Australian Glyphosate Sustainability Working Group website houses current information on weed populations that have been declared as resistant. Please consult glyphosateresistance.org.au for further information.

10. WeedSmart

WeedSmart is an initiative that promotes the long-term sustainability of glyphosate and other herbicide use in Australian agriculture. The program provides farmers and agronomists with the latest tools and resources to manage herbicide resistance. Further information on WeedSmart can be found at www.weedsmart.org.au.
1. **TUA fees**

Prices are per green hectare and excluding GST except Northern Australia Development Offer: Cotton EPR which is priced per bale ginned cotton lint.

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<thead>
<tr>
<th>Product</th>
<th>Standard Price</th>
<th>Northern Australia Development Offer: Cotton EPR</th>
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<tr>
<td>BOLLGARD® 3 with ROUNDFLEX Ready®</td>
<td>$420 (ex. GST)</td>
<td>$32.50/bale</td>
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<tr>
<td>BOLLGARD II® with ROUNDFLEX Ready®</td>
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<td>BOLLGARD II®</td>
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<tr>
<td>ROUNDFLEX Ready®</td>
<td>$79 (ex. GST)</td>
<td>$32.50/bale</td>
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</tbody>
</table>

Payment due date (to nominated TSP): 28 February 2020

Payment due date (to nominated TSP) 30 days from End of Month of invoice*  

*Date on the invoice given to the nominated TSP from Monsanto

2. **Northern Australia Development Offer**

(a) Northern Australia Development Offer is available to Growers who have:

(i) any area of BOLLGARD II® Cotton on their Farm Unit; and/or
(ii) any area of BOLLGARD II® Stack Cotton on their Farm Unit; and/or
(iii) any area of BOLLGARD® 3 Stack Cotton on their Farm Unit; and/or
(iv) an area of ROUNDFLEX Ready® Cotton on their Farm Unit.

(b) To participate in the Northern Australia Development Offer, a Grower and the Grower’s Nominated TSP must complete, sign and return a Planting Audit and Northern Australia Development Offer form for each eligible Field on the Farm Unit.

(c) Growers who do not submit a completed and signed Planting Audit and Northern Australia Development Offer form before the applicable due date, will be enrolled automatically in the Northern Australia Development Offer for all eligible Fields on the Farm Unit.
The Rebate Amounts assume the maximum label application rate for each Participating Product and will be reduced depending on the actual application rate used by the Eligible Grower on Qualifying Hectares. Any Participating Product application rate that exceeds the maximum label application rate for such Participating Product will only be eligible for a rebate based on the maximum label application rate.

For weed resistance management purposes, a rebate on validated, qualified purchases of Participating Products during the 2019/20 season.

Other Roundup Ready PLUS Program Details

Information that Eligible Grower provides Monsanto for the RRPLUS Program, and Monsanto may share such information with third parties for RRPLUS Program purposes. Eligible Growers must keep records necessary to demonstrate compliance with the RRPLUS Program, and Monsanto may audit Eligible Grower’s records to verify the accuracy of information provided by Eligible Grower.

Monsanto does not guarantee the availability of Participating Products during the 2019/20 season.

Participating Products applied using optical spraying equipment or other spot sprayers are not eligible for rebates under the RRPLUS Program.

Monsanto will provide Eligible Grower the applicable rebate on validated, qualified purchases of Participating Products via electronic funds transfer into the Eligible Grower’s nominated bank account by June 1 2019 and April 30 2020 on the same Qualifying Hectare. Eligible Growers need to be accredited to use Bollgard 3 and/or Roundup Ready Flex cotton. Bayer runs accreditation meetings throughout the year. Your Technology Service Provider (TSP) can give you more information.

BG3 (BOLLGARD 3)
The third generation insect technology that kills Helicoverpa spp. pests.

Cry1Ac
One of three proteins produced in Bollgard 3 cotton plants that is derived from a common soil bacterium and that is toxic to specific insects.

Cry2Ab
One of three proteins produced in Bollgard 3 cotton plants that is derived from a common soil bacterium and that is toxic to specific insects.

EPR (END POINT ROYALTY)
Cotton growers north of the latitude 21.15 degrees are eligible for the Northern Australia Development Offer. This offer enables growers to pay their technology fee via End Point Royalty. An End Point Royalty is paid on a per bale basis, after ginning and enables growers to manage production and cash flow risks. Consult the TUA for further details.

RMP (RESISTANCE MANAGEMENT PLAN)
Compliance with the RMP is required under the terms and conditions of the Bollgard II/Bollgard 3 Technology User Agreement and under the conditions of registration of the Bollgard II and Bollgard 3 technology.
GROWER REQUIREMENTS

GENERAL GROWER REQUIREMENTS

Complete an accreditation

Sign a Technology User Agreement (TUA) before taking delivery of seed

Read, understand and comply with the current requirements of the TUA Terms and Conditions and Resistance Management Plan (RMP)
GROWER REQUIREMENTS

GENERAL GROWER REQUIREMENTS

- Complete an accreditation
- Sign a Technology User Agreement (TUA) before taking delivery of seed
- Read, understand and comply with the current requirements of the TUA Terms and Conditions and Resistance Management Plan (RMP)
GROWING COTTON IN NORTHERN AUSTRALIA

2019/20 GROWER GUIDE

QUESTIONS?
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QUESTIONS?
FOR MORE INFORMATION PLEASE CONTACT:

bollgard3.com.au

Please refer to the 2019/20 Bollgard II, Bollgard 3, Roundup Ready Flex cotton Technology User Agreement (“TUA”) for Northern Australia General Terms and Conditions before you plant for full details on the Northern Australia Development Offer program and on growing Bayer’s cotton traits in the 2019/20 season.

The term ‘price’ refers to the TUA Fee(s) as defined in the Technology User Agreement General Terms and Conditions document.

Bayer has made every effort to ensure the accuracy of the information provided. However, Bayer makes no express or implied warranties as to the recommendations and assumes no liability for loss, damage, injury or civil action incurred by those who use it. Any reference to products or companies is not an endorsement of a warranty of those products or companies.

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Front cover photo: Brett and Anna Corish, 2018 Bayer Cotton Growers of the Year, Mundine, Goondiwindi.