

Roundup Ready® canola

2010 Crop Management Plan



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ROUNDUP READY® CANOLA – Crop Management Plan
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Roundup Ready[®] canola Crop Management Plan (CMP)

Objective

The Roundup Ready canola Crop Management Plan details strategies that can be implemented on-farm to manage risks to the integrity of grain crop supply-chains and the sustainability of agricultural production. These strategies:

1. Contribute to the long-term economic and environmental sustainability of agricultural production systems utilising Roundup Ready canola
2. Maximise the life of the Roundup Ready canola technology, while allowing farmers and the community at large to realise fully the economic, agronomic and environmental benefits offered by the technology, and
3. Enable different production/market systems to concurrently operate in a profitable and sustainable way, in response to changing market and non-market requirements

Specifically, growers of Roundup Ready canola are required to implement on-farm management practices that aim to:

- ▶ Prevent the evolution of herbicide resistant weeds
- ▶ Control Roundup Ready canola volunteers
- ▶ Minimise risks to the integrity of grain supply-chains
- ▶ Ensure good crop agronomy in a sustainable manner
- ▶ Meet all other regulatory requirements

Training and Accreditation

Growers, Technology Service Providers and/or agronomists are required to attend a Roundup Ready canola Accreditation Programme as part of the Roundup Ready canola stewardship strategy. The participants must attend training and exhibit competency before they will be accredited to service or use the technology. Upon completion the participants will become accredited to use or service Roundup Ready canola.

It should be noted that any accredited Technology Service Providers and/or agronomists have a duty of care to ensure that all recommendations made are in accordance with the Crop Management Plan, Resistance Management Plan, Technical Manual, Roundup Ready herbicide label, seed label, and License and Stewardship Agreement.

Communication

The Crop Management Plan forms part of the conditions of the Licence and Stewardship Agreement, which a grower is required to sign before growing Roundup Ready canola. Details of the Crop Management Plan will also be included as part of the accreditation course and the Technical Manual for Roundup Ready canola.

Resistance Management Plan

The sustainable use of glyphosate based herbicides (e.g. Roundup Ready herbicide) is critical for Australian farming systems. Furthermore, longevity of Roundup Ready technology in Australia can only be ensured by minimising the development of weed resistance to glyphosate based herbicides. Hence, the Resistance Management Plan (RMP) is a critical component of the Crop Management Plan.

The Resistance Management Plan has been developed by Monsanto in consultation with leading Australian weed researchers.

The Resistance Management Plan aims to ensure the sustainable use of Roundup Ready herbicide in Australia, through growers implementing management practices, within a crop rotation incorporating Roundup Ready canola, to minimise the risk of weeds developing resistance to glyphosate.

PRAMOG

Growers must complete the Paddock Risk Assessment Management Option Guide (PRAMOG[®]) as a condition of the License and Stewardship Agreement. PRAMOG is a tool that identifies existing risk potential for glyphosate resistance and suggests additional management options to minimise this risk in the years after growing Roundup Ready canola. This approach recognises that each paddock has a unique Glyphosate Resistance Risk Profile, and allows growers to choose management options that are complementary to their individual farm planning requirements.



Growers must provide details of the outcomes of PRAMOG for each paddock to be planted to Roundup Ready canola to their Technology Service Provider prior to the commencement of planting.

Records

Roundup Ready canola growers must maintain a set of paddock management records, for all paddocks in which they grow, or intend to grow Roundup Ready canola. Ideally, these records should commence prior to growing Roundup Ready canola, however they must be maintained and updated during the growth of the crop, and for **three years** after harvest. These records are to be made available to Monsanto or regulatory authority nominated auditors when requested. As a minimum, records should include:

- ▶ History of crop and weed management practices on the paddock (e.g. herbicide and non-herbicide weed control, sowing dates, sowing rates, etc)
- ▶ Names, rates, application methods, application dates, and effectiveness of herbicides applied
- ▶ Weed type, numbers and herbicide resistance status present in the paddock
- ▶ Soil types

Inspections

Growers or their nominated agronomist must inspect paddocks between 14 and 28 days after spraying Roundup Ready herbicide to monitor the effectiveness of the herbicide application. During these inspections, any surviving weeds that are normally sensitive to glyphosate application, should be identified and reported to their Technology Service Provider.

Audits and Compliance

Monsanto or the grower's Technology Service Provider will undertake random audits of Roundup Ready canola paddocks and records maintained by the farmer to ensure the Resistance Management Plan has been implemented and that the paddock is in Compliance with the License and Stewardship Agreement Terms and Conditions.

If a Roundup Ready canola paddock is deemed to be Non-Compliant, Monsanto will work with the farmer and the Technology Service Provider to implement appropriate practices to ensure the paddock comes back into Compliance.

A compliance levy may be charged to allow additional audits to be conducted, to confirm that the paddock is back in Compliance. This would normally be done by inspecting the paddock and the farmer records.

If a dispute occurs between the farmer, the Technology Service Provider and Monsanto regarding implementation of the Resistance Management Plan, the dispute will be referred to independent arbitration for resolution.

Crop agronomy

Good crop agronomy is essential to maximising the value of this technology to the grower. Sustainable production is a primary aim of good crop agronomy, and includes many factors that are not unique to the production of Roundup Ready canola.

Good crop agronomy also maximises crop competition with weeds and is an important tactic for reducing weed numbers. This is helpful in reducing the selection pressure for the development of herbicide resistance.

The Crop Agronomy aspects are addressed in the Roundup Ready canola Technical Manual and include, but are not limited to, the obligations and recommendations applicable to:

- ▶ maintaining adequate records
- ▶ paddock mapping and identification
- ▶ selecting appropriate varieties
- ▶ purchasing seed
- ▶ taking receipt of seed
- ▶ planting
- ▶ applying insecticide
- ▶ applying herbicide
- ▶ flowering
- ▶ windrowing
- ▶ harvesting

Increased focus with respect to genetically modified (GM) crop production will be placed on: pre-sowing and post-sowing machinery cleanliness, paddock identification, identification of neighbouring crops, pre-swathing and post-swathing machinery hygiene, pre-harvest and post-harvest machinery hygiene, and any regulatory requirements as they relate to crop husbandry.



Management of Open Pollinated Canola

Co-existence

A key objective of the Roundup Ready canola stewardship strategy is to maintain product integrity within the Roundup Ready canola crop and that of surrounding crops. The Roundup Ready canola Technical Manual provides details of the supporting research and literature from which these guidelines were developed.

Table 1. Requirements for growing Roundup Ready canola near other canola in Australia, to minimise the occurrence of off-types.

MINIMUM DISTANCES FOR MANAGING ADVENTITIOUS PRESENCE OF GM GRAIN TO BE LESS THAN 0.9%, BETWEEN GM CANOLA AND:	GRAIN PRODUCTION Non-GM canola & all other canola.	SEED PRODUCTION Foundation Seed canola
		5 metres

Where an alternate standard (i.e. lower threshold for non-Roundup Ready canola) is required in response to market requirements and product specifications, or there is a plan to grow a specialty canola crop that requires specific management to maintain product integrity (e.g. High Oleic, High Erucic, GM Free or Organic Canola), appropriate management strategies applicable to the growing and processing of the crop should be incorporated as deemed and communicated by the supply chain for the specified product.

If non- Roundup Ready and Roundup Ready canola crops are to be grown in adjacent paddocks (within 5m of each other), and there is a supply chain requirement to deliver and declare the grain separately, the following management practices must be adopted:

- A narrow band (at least 5m) of the Roundup Ready crop should be slashed and/or cultivated prior to the onset of flowering, or
- If the crops are grown within the same farming operation, a narrow band (at least 5m) of the non- Roundup Ready crop can be harvested and processed as part of the Roundup Ready crop and subsequently managed as per the Roundup Ready paddock for volunteer control.

Where a farmer grows a Roundup Ready canola crop along a boundary fence line that is adjacent to a neighbouring canola crop (or within 400m of a seed production crop), the farmer should notify the neighbour and discuss any relevant matters.

The area immediately adjacent (at least 5m) to the Genetically Modified crop should be treated as per the Roundup Ready paddock for subsequent volunteer control.

Movement of pollen can occur beyond 5m, with isolated low frequency events occurring over greater distances. The level of pollen movement declines rapidly with increasing distance. Growers should ensure provisions for this are included in their weed management plans.

Minimising the potential for multiple herbicide tolerance developing in canola volunteers

Pollen movement between open pollinated canola crops will always occur. Although the risk is very low, the development of plants tolerant to more than one herbicide could occur through cross-pollination between crop varieties. The above separation distances are recommended to minimise this potential.

Minimising the potential for outcrossing between canola and weeds

Weed species that are closely related to canola occur throughout many canola growing regions in Australia. Studies have shown that there is the potential for naturally occurring hybrids to form between canola and wild radish, burchan weed or charlock. These events are extremely rare and often result in infertile hybrids. Attempts to transfer Herbicide Tolerance (HT) genes from canola into wild radish, burchan weed or charlock populations by backcrossing the hybrids to the weedy parent species have failed (ie. no introgression of HT traits has been possible). Good agricultural practice will ensure these weeds are controlled in crop and non-crop situations, thus, there will be minimal opportunity for Roundup Ready canola to form hybrids with them.



To date, in the small number of interspecific hybridisation events that have been closely studied, the direction of pollen transfer is primarily from the weed species to canola. This means that the resulting seed is likely to be harvested with the rest of the crop and, in the event it is not, should be treated in the same manner as to volunteer canola.

B. rapa and *B. juncea* are crops/weeds that are very closely related to canola, and have the potential to hybridise with canola. Introgression of HT traits is possible but unlikely to occur naturally, and would not confer increased fitness or spread as a weed, relative to conventional *B. rapa* and *B. juncea*. In areas where *B. rapa* or *B. juncea* occur within or adjacent to Roundup Ready canola paddocks, they should be managed similarly to volunteer Roundup Ready canola (i.e. they should be controlled with other herbicides or cultural techniques).

Management of outcrossing events

Multiple herbicide tolerant canola volunteers and herbicide tolerant weed hybrids could occur at very low to extremely low levels, respectively. These plants can be controlled by an integrated weed management program, including the use of other herbicides and cultural methods. Multiple herbicide tolerant canola should be anticipated by farmers in order to effectively control canola volunteers.

The following measures are required to reduce potential impact of gene movement:

- ▶ discuss your intention to grow Roundup Ready canola with neighbours
- ▶ respect separation distances
- ▶ scout paddocks to identify herbicide tolerant canola in succeeding crops
- ▶ keep paddock records
- ▶ clean machinery and trucks
- ▶ use appropriate rotations

Identification and Control of Volunteer Canola

It is essential to monitor and manage the appearance of volunteer canola in both crop and non-crop situations. The primary aim of volunteer management should be to limit the spatial and temporal distribution of Roundup Ready canola by preventing pollen movement and seed set in years subsequent to growing of the crop.

Volunteers are likely to be found for three years after growing the crop and should be controlled prior to flowering. Burial of canola seed to a depth greater than 5cm is not recommended as this can substantially delay the emergence of volunteers (secondary dormancy can be induced). Inspection regimes for identifying volunteers should take tillage practices into consideration.

The following situations must be assessed for the presence of volunteers:

- In a paddock, where Roundup Ready canola has been grown
- In a paddock immediately adjacent to where Roundup Ready canola has been grown
- In areas where seed or grain spillage has resulted during transport (eg. roadsides)
- In any area where ineffective machinery clean down may deposit viable seed
- In areas where grazing animals excrete for 7 to 10 days after digesting seed
- Any areas where physical movement of seed may result in volunteers

Any plants present in a paddock that may be suspected to be Roundup Ready canola should be controlled as outlined below:

- **Prior to crop establishment**
Through the use of a knockdown herbicide (with an appropriate tank-mix partner if using glyphosate based products) and/or cultivation
- **In-crop**
Through the use of an appropriate registered herbicide for the crop being grown
- **In non crop situations**
Through the use of grazing, mowing, grading or herbicide application as appropriate for the situation to prevent the canola reaching maturity

When making spray decisions to control volunteer canola, growers should be aware of previous herbicide tolerant canola cropping both on their farm and that of their neighbours and modify herbicide choice appropriately.

Refer to the Roundup Ready canola Technical Manual for a complete list of herbicidal and cultural options.



Farmer Saved Seed

Under the Licence and Stewardship Agreement, farmers are not permitted to save seed for replanting in subsequent years. Under no circumstances may Roundup Ready canola farmer saved seed be supplied to another party for replanting.

MONSANTO DOES NOT WARRANT THE SAFETY OR PERFORMANCE OF THE ROUNDUP READY TECHNOLOGY OR ROUNDUP READY HERBICIDE WHEN SAVED SEED FROM ROUNDUP READY CANOLA IS USED FOR PLANTING.

Seed Hygiene, Planting, Storage and Transport at Harvest

Attention to seed hygiene, storage and transport when planting and harvesting Roundup Ready canola assists in effective weed management and volunteer control.

Consistent with conventional crop hygiene techniques, an effective equipment clean-down procedure is important in preventing the dispersal of Roundup Ready canola seed. This includes equipment such as seed drills and harvesters, and is important for both contractor equipment and machinery kept and used on farm. The farmer should notify any equipment contractor of the relevant crop's GM status.

On and off the farm, appropriate measures must be taken to avoid spillage during transport and intermediate storage of the harvested crop.

The seed of Roundup Ready canola varieties must be stored separately from other canola seed upon receipt and the label information must be retained with the seed. Keep the seed in a leak proof storage area and maintain the seed in its original packaging to ensure seed quality. For storage, the surplus of seed must not be mixed with other seeds and must remain identifiable.

Where Roundup Ready canola and other canola varieties are mixed together, the grain must be treated as GM. Growers should clearly identify the GM status of the load and the variety grown to their carrier as this will need to be declared when the grain is delivered to a grain handler or processor to avoid unintended mixing with non-GM grain

Situations where Roundup Ready canola should not be grown

Roundup Ready canola should not be grown in the following situations:

- i) Where the risk of developing glyphosate resistance in growing Roundup Ready canola is high in (as indicated by PRAMOG)
- ii) In vineyards for biofumigation purposes
- iii) Within 5m of non-Roundup Ready canola crops when supply chain requirements require separate delivery and declaration of non-GM canola crops, unless management practices outlined in the above "Management of Open Pollinated Canola" section are adopted
- iv) Within 400m of Foundation Seed canola crops

Adverse Event Reporting

Growers are required to report any adverse event to Monsanto as soon as it is identified. Monsanto will investigate the incident and produce a report and recommendations as required.

Who to contact for assistance

If any grower encounters problems in complying with the Australian Roundup Ready canola Crop Management Plan, or would like any other information, please contact your Roundup Ready canola Technology Service Provider or Monsanto by calling 1800 069 569 or visiting www.monsanto.com.au



Roundup Ready canola Resistance Management Plan (RMP)

Resistance Management Principles for Roundup Ready canola

1. Aim to enter the Roundup Ready canola phase of the rotation with a low weed burden
2. Integrate as many different weed control options (chemical and cultural) as possible through all phases of the crop rotation
3. Make every herbicide application count - use registered rates - and assess effectiveness
4. Rotate herbicides with different modes of action throughout the crop rotation
5. Rotate herbicide tolerant crops with tolerance to different modes of action herbicides throughout the crop rotation
6. Regularly monitor the effectiveness of resistance management practices
7. Test weed populations for herbicide resistance status as part of ongoing integrated weed management

Goal

Through the implementation of management practices, within a crop rotation including Roundup Ready canola, manage the weed population to ensure the long-term sustainable use of glyphosate herbicide in Australian farming systems, by minimising the risk of weeds (particularly annual ryegrass) developing resistance to glyphosate based herbicides.

Strategy

To incorporate a range of cultural and herbicide management practices that maximise control of weeds which may be resistant to glyphosate. The implementation of these practices should result in a reduction in the weed population entering the subsequent phase of crop rotation.

Tactics

Selection and adoption of specific management practices will require consideration of the impact of the following:

- The presence or absence of weeds with established resistance to the management practice (i.e. herbicide resistance)
- The effectiveness of weed control following the application of the management practice
- The rotation phase within which the management practice is selected for inclusion
- The inclusion or exclusion of glyphosate as a knockdown herbicide within the rotation
- The complementary and/or synergistic impact of two or more management practices
- The sustainable use of the management practice within the crop rotation
- The ability to assess glyphosate resistance risk potential on a paddock by paddock basis not excluding fence lines



PRAMOG – The Paddock Risk Assessment/Management Tool

Incorporating weed control management practices that rotate away from glyphosate herbicide in the year immediately following Roundup Ready canola is the simplest and most effective way of minimising the risk of weeds developing glyphosate resistance.

However, rotating away from glyphosate herbicide in the year following Roundup Ready canola is not always practical or feasible so farmers require options that may allow the continued use of glyphosate. Farmers are requested to complete the model below, regardless of their choice to use or not use glyphosate in the year after Roundup Ready canola, on the basis that doing so highlights the glyphosate resistance risk potential.

The Paddock Risk Assessment and Management Option Guide (PRAMOG®) provides farmers planning to grow Roundup Ready canola with an individual paddock risk assessment management tool, that when completed will:

1. Provide a “Risk Assessment” in relation to the potential risk (i.e. increasing or decreasing) of developing herbicide resistance to glyphosate within the current ryegrass population
2. Provide a decision making process that allows a farmer flexibility to continue to utilise glyphosate as a knockdown herbicide in the year following Roundup Ready canola by outlining a number of alternate management practices that a farmer can select and implement in order to manage the ryegrass population present

Each paddock nominated for planting to Roundup Ready canola will exhibit a unique Glyphosate Resistance Risk Profile. This is based on the implementation of various management strategies throughout the previous crop rotation within the paddock.

The two key management strategies that will determine the Glyphosate Resistance Risk Profile of the annual ryegrass population within a paddock are:

- a) **Glyphosate Application Index:** The number of applications of glyphosate to a population of ryegrass within a paddock will determine the selection pressure applied to that ryegrass population for glyphosate resistance. Further, the intensity of selection pressure depends on the type of application (e.g. a glyphosate application followed by full-cut cultivation provides less intensive selection pressure than a no-till glyphosate application). The index combines the elements of selection frequency and intensity to produce a risk index rating
- b) **Herbicide Mode Resistance Status:** This is the number of herbicide modes of action to which ryegrass in the paddock are resistant. The herbicide resistance status of a paddock reflects the outcomes of previous management practices for the control of ryegrass. It is an indicator of the resistance pressure that has already been placed on glyphosate



PRAMOG Directions for Use:

1. All farmers must complete a PRAMOG assessment, regardless of whether or not they intend to use glyphosate herbicide in the year following Roundup Ready canola
2. Glyphosate herbicide should not be applied in the year following Roundup Ready canola unless this is not feasible or practical. Where it is not feasible or practical to avoid the application of glyphosate in the year following Roundup Ready canola, PRAMOG provides an indicator of risk, and a means of identifying additional management practices to reduce this risk of glyphosate resistance developing
3. Calculate the Glyphosate Resistance Index, using figure 1 shown below. Mark the number of each type of glyphosate application (over the last 20 years) that were applied to the paddock intended for planting Roundup Ready canola. Multiply this by its weighting, and record this in the far right column. Tally the numbers in the far right column to give the Glyphosate Resistance Index

Figure 1: Glyphosate Resistance Index

TYPE OF GLYPHOSATE APPLICATION	NUMBER OF APPLICATIONS	WEIGHTING	MULTIPLIED
Winter Fallow (with no grazing), Roundup Ready		4	
Knockdown with minimal soil disturbance (e.g. No – Till or Zero – Till), Pasture Topping, Crop Topping, Fallow (with grazing)		3	
Knockdown with minimal or no soil disturbance followed by Paraquat and/or a seed set control practice.		2	
Knockdown followed by full soil disturbance (i.e. full – cut cultivation)		1	
No Roundup (or glyphosate)		0	
INDEX = Sum			

4. Refer to Figure 2 for the Glyphosate Herbicide Resistance Risk Profile. Find the Glyphosate Resistance Index category in the left column. **If the glyphosate herbicide application history of the paddock is not known, select the middle category (20-29) on the left hand axis**
5. The top row of the matrix in Figure 2 shows the number of herbicide groups for which herbicide resistance has been suspected or confirmed for ryegrass within the paddock intended for planting Roundup Ready canola. For example, if resistance has been suspected or confirmed to Group A herbicides (Fops and/or Dims), the Herbicide Mode Resistance Status would be one, if resistance has been suspected or confirmed to Group A and B herbicides (Fops and/or Dims plus sulfonylureas and/or IMI's) the Herbicide Mode Resistance Status would be two, etc. **If the Herbicide Mode Resistance Status is not known, choose either the number TWO for a paddock in Western Australia or ONE for a paddock in Eastern Australia**
6. Draw a line across from the Glyphosate resistance index category and down from the Herbicide mode resistance status
7. The box where the two lines meet shows the level of risk for glyphosate resistance developing in ryegrass populations in this paddock. This rating determines the number of mandatory management practices that a farmer should implement as part of the Resistance Management Plan for Roundup Ready canola where the farmer wishes to continue to utilise glyphosate as a knockdown herbicide for weed control in the following year. Alternatively the point of contact may determine that the resistance related risk of using glyphosate in the year following Roundup Ready canola is too high



Figure 2: Glyphosate Herbicide Resistance Risk Profile

GLYPHOSATE RESISTANCE INDEX	HERBICIDE MODE RESISTANCE STATUS			
	0	1	2	3
>=40	2	NG	NG	NG
30-39	2	2	2	NG
20-29	2	2	2	2
10-19	1	1	2	2
<10	1	1	1	1

It is recommended that farmers seek advice from their Technology Service Provider or other expert sources to ensure an integrated weed management plan is established for all paddocks.

1 = A minimum of one additional management practice must be nominated and implemented

2 = A minimum of two additional management practices must be nominated and implemented*

No Glyphosate (NG) = A minimum of two additional management practices must be nominated and implemented, and Monsanto recommends that farmers do not use glyphosate in the year following Roundup Ready canola

* It is recommended that farmers seek to voluntarily leave glyphosate out of their herbicide program for at least one year in the next three years following Roundup Ready canola.

8. Refer to Figure 3 for Glyphosate Resistance Management Plan Option Selector and choose the appropriate number of nominated management practices (determined in Step 7)

Figure 3: Glyphosate Resistance Management Plan Option Selector

RESISTANCE MANAGEMENT PLAN PRACTICES

YEAR FOLLOWING ROUNDUP READY CANOLA	CONTROL OF EMERGED WEEDS PRIOR TO PLANTING		IN-CROP WEED CONTROL
	HERBICIDE	CULTIVATION	HERBICIDE
OPTIONS	Paraquat/Diquat	Full Soil Disturbance	Pre-Emergent or Post-Emergent Herbicide

NOTE: Additional non-herbicidal practices are also highly recommended, these are listed in Figure 4.

9. Farmers are advised to incorporate additional resistance management strategies during different phases of the crop rotation. (i.e. cereal, legume, fallow, pasture) as this minimises the on set of herbicide resistance. Additional suggested options are outlined in Figure 4.



Figure 4: Additional management practices that farmers should aim to include where possible and appropriate, as part of an integrated weed management plan.

WEED MANAGEMENT STRATEGIES FOR OTHER PHASES OF THE CROP ROTATION

TACTIC	RYEGRASS CONTROL LEVEL (%) LIKELY (RANGE)
MOWING	95 (90–98)
HAY, SILAGE, GREEN MANURE	90 (80–98)
LONG FALLOWS	75 (50–90)
PASTURE OR CROP TOPPING/WEED WIPING	70 (50–95)
STRATEGIC GRAZING	70 (30–95)
PASTURE MANIPULATION TO REDUCE GRASSES	70 (50–90)
WEED SEED COLLECTION AT HARVEST	60 (45–75)
PRE-SOWING CULTIVATION	50 (35–70)
HIGH SEEDING RATES	40 (25–50)
STRATEGIC BURNING	40 (10–90)
MINIMISE BURIAL OF SEED	40 (20–50)
AUTUMN TICKLE FOLLOWED BY CONTROL	35 (15–55)
SWATHING/WINDROWING	35 (10–80)
GOOD CROP AGRONOMY	30 (25–50)
SOUND CROP ROTATIONS	Allows IWM practices to be employed
HERBICIDE GROUP ROTATION	Minimises resistance and large weed populations
FARM HYGIENE	Minimises unnecessary weed seed

Resistance Management Plan Reporting, Monitoring, and Non-Compliance

Reporting

As part of the Planting Declaration, the Technology Service Provider will record the completion and profile of PRAMOG Steps 1 to 7. Additionally, the Planting Declaration will also be used to record **either** the omission of glyphosate in the following year or the completion of Step 8 and the subsequent actions selected for implementation in the year following Roundup Ready canola.

Monitoring

The grower or the agronomist must inspect paddocks between 14 and 28 days after spraying Roundup Ready herbicide to monitor the effectiveness of the herbicide application. During these surveys, any surviving weeds that are normally sensitive to glyphosate application, should be identified. The inspections should be recorded as part of the Roundup Ready canola Crop Management Plan checklist.

Monsanto, or the grower's Technology Service Provider, will undertake random audits of Roundup Ready canola paddocks and records maintained by the grower to ensure the implementation of the Resistance Management Plan has been undertaken and that the paddock is in Compliance with the License and Stewardship Agreement Terms and Conditions.



If a farmer chooses to change either the selected components or the time of implementation of components within the Resistance Management Plan, the farmer should notify the Technology Service Provider.

If through the random audit by Monsanto or the Technology Service Provider of a Roundup Ready canola paddock it is found to be Non-Compliant, Monsanto will request the farmer to implement appropriate practices to ensure the paddock comes back into Compliance (refer below).

Non-Compliance

Where a farmer is found not to have completed or implemented management practices nominated within the Resistance Management Plan and has not notified the Technology Service Provider, the Roundup Ready canola paddock will be deemed to be Non-Compliant.

The Technology Service Provider must notify Monsanto where a paddock becomes Non-Compliant and detail the remedial management practices that will bring the paddock back into Compliance.

It is the responsibility of the farmer and the Technology Service Provider to undertake and implement appropriate management practices that will bring the paddock back into Compliance.

If a remedial management practice cannot be implemented in the year following Roundup Ready canola, then the farmer, under the direction of the Technology Service Provider, will be required in the second year following the Roundup Ready canola crop to either:

1. Not apply glyphosate as a knockdown herbicide for control of emerged weeds prior to planting, or
2. If intending to apply glyphosate, undertake to practice a weed management plan as agreed to by Monsanto, the Technology Service Provider and the farmer

A Resistance Management Plan compliance levy may be charged to allow additional audits to be conducted, to confirm that the paddock is back in "Compliance". This would normally be done by inspecting the paddock and the farmer records.

Dispute Resolution & Arbitration

If a dispute occurs between the farmer, the Technology Service Provider and Monsanto regarding implementation of the Resistance Management Plan, the dispute will be referred to independent arbitration for resolution. Arbitration of the dispute will be based on an objective assessment of the individual risk of glyphosate resistance for each paddock.

NATURALLY OCCURRING RESISTANCE TO GLYPHOSATE: Naturally occurring weed populations, for example ryegrass, may possess biotypes with resistance to glyphosate. Farmers should be aware of this prior to using the glyphosate based herbicides and should aim to decrease the development and growth of resistant populations. If you suspect resistant biotypes are present, these should be sampled and tested.

Importation of weed seeds from external sources may corrupt the outcomes of this model. If ryegrass seed has been imported into a paddock, the history of the previous paddock should also be investigated for herbicide applications and resistance status.

This Resistance Management Plan aims to reduce the likelihood of glyphosate resistance developing. It does not provide a guarantee that there will be no resistance to glyphosate. Please notify your Technology Service Provider and Monsanto if any weeds survive an application of glyphosate.

Disclaimer

Always read and follow the directions and precautions on the label for Roundup Ready® herbicide and Roundup Ready® canola, and any other special conditions that may accompany the License and Stewardship Agreement.

All the information provided in this technical manual is provided for general information only and no reader should act upon any material contained in this manual without considering his or her individual situations. Roundup Ready crops contain genes that confer tolerance to glyphosate, the active ingredient in Roundup Ready herbicide. Roundup Ready herbicide will kill plants that are not tolerant to glyphosate.

At the time of printing, dealings with Roundup Ready canola at levels above those prescribed by each state are banned in the Australian Capital Territory, South Australia, Tasmania and Western Australia. This means that dealings, including but not limited to, planting, transport or storage of seed or grain, of Roundup Ready canola must not be conducted in these states.

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