Pacific Seeds

Growing possibilities

HYOLA XC STEWARDSHIP GUIDE

pacificseeds.com.au

NEW

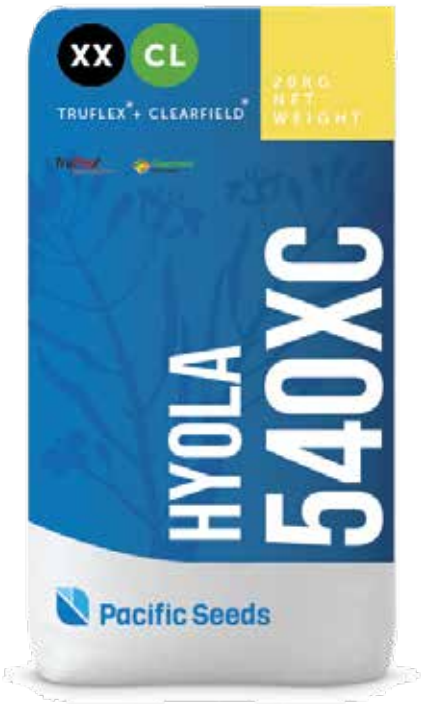
TRUFLEX®
+ CLEARFIELD®

World's first TruFlex® + Clearfield® dual tolerant canola hybrid from Pacific Seeds

HYOLA® XC TECHNOLOGY

Pacific Seeds has developed and released a world first GM dual tolerant canola technology system for Australian canola growers, branded as Hyola® XC Canola. Hyola® XC Canola is a combination of TruFlex® and the BASF Clearfield® (Imidazolinone) herbicide technology within the same hybrid canola plant. This process was undertaken using genetic modification or editing, and is therefore able to be grown only where no restrictions with regards to the moratoriums in place in certain Australian states on the production of GM canola.

This guide has been prepared to provide an understanding of the benefits and limitations of Hyola® XC Technology canola. It also provides industry guidelines for the best management practices (BMP) and stewardship of Hyola® XC Canola. The agronomic performance and variety characteristics of current Hyola® XC varieties are available on www.nvtonline.com.au.



THE HYOLA® XC TECHNOLOGY SYSTEM

Hyola® XC technology was developed in full consultation with leading Australian weed and herbicides scientists as well as agronomic input from key agronomists right across Australia. The value behind the development was to provide the industry with an additional canola herbicide technology option that utilised one powerful knockdown + one residual weed control herbicide chemistries (TruFlex & Imidazolinone), into a one flexible package.

Given that 20% is Roundup Ready® and 10-15% is Clearfield® of Australian canola production, it was logical to investigate and develop canola combining the 2 technologies, as they were already well established and understood in Australian canola farming practices.

Number one for flexibility of spray timing with both quick knock down and extended residual protection available using key chemical groups you need, Hyola® XC hybrid canola technology will become a vital component in the IWM soil residual carryover protection toolbox. Mixing and rotating herbicide actives in crop is now the most valuable tool in resistance management when compared to rotating over successive seasons with individual chemistries. Visit https://www.crop.bayer.com.au/tools-and-services/mix-it-up/ for more details.

Hyola® XC hybrid canola technology can be adopted and utilised in addition to Hyola® XX technology, where Hyola® XC technology can be implemented in paddocks with low levels of group B residual after previous group B IMI tolerant winter crops and in weedy paddocks where growers are experiencing moderate to high levels of problem weed species.

*Please note that currently there is no APVMA registration for tank mixing of TruFlex® and Clearfield® herbicides together over the top of Hyola® XC Canola. For further information regarding tank-mixing please consult with your local Bayer, Pacific Seeds or BASF representative. Approved label instructions for each product must always be followed, in particular application timings, application rates, approved tank mix partners, withholding periods and plant back periods.

HYOLA® XC TECHNOLOGY KEY FEATURES

Combining TruFlex® and Clearfield herbicide technologies, the Hyola® XC hybrid canola range is an important new tool in high level weedy paddocks and will become a strongly preferred flexible alternative to single herbicide trait hybrid and OP canola varieties.

Pacific Seeds recognises the need for new hybrid canola varieties to have higher yield and provide a wider level of flexibility in spray timing with both quick knock down chemistry and with the stacked products additional added value components such as soil residual carryover protection and extended in-crop residual activity enhancing the grower's overall cropping system IWM toolbox options.

ROUNDUP READY® CANOLA TECHNOLOGIES

CROP MANAGEMENT PLAN

BAYER

TruFlex® CANOLA

Roundup Ready® CANOLA

OBJECTIVE

The Roundup Ready® Technology Crop Management Plan (CMP) details strategies that can be implemented on-farm to help manage risks to the integrity of grain supply-chains and the sustainability of agricultural production. It does not attempt to capture or reflect existing legal obligations and, unless explicitly stated, does not mandate particular strategies.

COEXISTENCE

Coexistence in agricultural production systems and supply chains is well established and well understood. Standards and best practices for coexistence were established decades ago and have continually evolved to deliver high purity seed and grain to support production, distribution and trade of products from different agricultural systems. For example, the successful coexistence of canola varieties with low erucic acid content for food use and high erucic acid content for industrial uses has occurred for many years.

The introduction of biotech crops generated renewed discussion focused on coexistence of biotech cropping systems with conventional cropping systems and organic production. These discussions have primarily focused on the potential marketing impact of the introduction of biotech products on other systems. The health and safety of biotech products are not an issue because their food, feed and environmental safety is well established by national regulators before they enter the agricultural production system and supply chain.

The coexistence of conventional, organic and biotech crops has been the subject of several studies and reports. These reports conclude that coexistence among biotech and non-biotech crops is not only possible but is occurring. They recommend that coexistence strategies be developed on a case-by-case basis considering the diversity of products currently in the market and under development, the agronomic and biological differences in the crops themselves and variations in regional farming practices and infrastructure. Furthermore, coexistence strategies are driven by market needs and should be developed using current science-based industry standards and management practices.

Successful coexistence of all agricultural systems is achievable and depends on communication, cooperation, flexibility and mutual respect for each system among growers. The primary responsibility for implementing practices to satisfy specific marketing standards or certification lies with that grower who is growing a crop to satisfy a particular market. This is true whether the goal is high oleic, low linolenic canola, non-GM canola or organically produced crops. In each case, the grower is seeking to produce a crop that is supported by a market price and consequently that grower assumes responsibility for satisfying reasonable market specifications. That said, good communication and understanding between neighbours is essential to maintaining segregation and coexistence. As such, growers of Roundup Ready Technologies are encouraged to work with their neighbours, in keeping with good industry practice. For example, it may be appropriate for neighbouring farmers to consider and discuss how they might each use additional management measures to help ensure reasonable coexistence, such as a seed production minimum distance or direct heading, where a neighbour is growing an organic or other specialty crop. Australian agriculture as a whole, benefits when Australian farmers are working together to meet all market demands.

IDENTITY PRESERVED PRODUCTION

Some canola growers may choose to preserve the identity of their crops to meet specific markets. Examples of Identity Preserved (IP) crops include specialty oil canola, food grade crops and any other crop that meets specialty needs, including organic and non-genetically enhanced specifications. Growers of these crops assume the responsibility and receive the benefit for ensuring that their crop meets mutually agreed-upon contract specifications. Based on historical experience with a broad range of IP crops, the industry has developed generally accepted IP agricultural practices. These practices are intended to manage IP production to meet quality specifications and are established for a broad range of IP needs. The accepted practice with IP crops is that each IP grower has the responsibility to implement any necessary processes. These processes may include sourcing seed appropriate for IP specifications, field management practices such as adequate isolation distances, buffers between crops, border rows, planned differences in maturity between adjacent fields that might cross-pollinate, and harvest and handling practices designed to prevent mixing and to maintain product integrity and quality.

GENERAL RECOMMENDATIONS FOR MANAGEMENT OF MECHANICAL MIXING AND POLLEN FLOW

For all canola crops that they wish to identity preserve or otherwise keep separated, growers should take steps to prevent mechanical mixing. Growers should make sure all seed storage areas, transportation vehicles and seeders are cleaned thoroughly both prior to and subsequent to the storage, transportation or planting of the crop. Growers should also make sure all planting equipment, harvesters and transportation vehicles used at harvest are cleaned thoroughly both prior to and their use in connection with the harvest of the grain produced from the crop. Growers should also make sure all harvested grain is stored in clean storage areas where the identity of the grain can be preserved.

It is recognised in the industry that a certain amount of incidental, trace level pollen movement occurs, and it is not possible to achieve 100% purity of seed or grain in any crop production system. Several factors can influence the occurrence and extent of pollen movement. As stewards of technology, growers are expected to consider these factors and talk with their neighbours about their cropping intentions. Growers should consider the following factors that can affect the occurrence and extent of cross-pollination to or from other fields.[1]

CROSS-POLLINATION CANOLA TO CANOLA

The rate of cross-pollination between two adjacent canola fields is generally low and this declines with distance (leptokurtic response). An Australian study by Rieger et al. (2002) showed that in the great majority of cases, even adjacent canola paddocks in Australia had pollen flow in a range of 0.00 to 0.07%. Whilst in a total of 197 individual samples of paddocks in a range of 0–5 km away from each other, pollen flow from paddock to paddock was always less than 0.25%, with no outcrossing detected at 69% of sites.[1]

Based on extensive review of scientific studies, GM canola may be grown in proximity to non-GM, with little risk that the non-GM canola will exceed the 0.9% adventitious presence industry threshold level (refer to table below).

RECOMMENDED SEPARATION DISTANCES FOR GROWING ROUNDUP READY TECHNOLOGIES NEAR OTHER CANOLA IN AUSTRALIA	
Minimum distances for managing Adventitious Presence of GM grain to be less than 0.9%, between GM canola and:	
GRAIN PRODUCTION	**SEED PRODUCTION**
Non-GM canola & all other canola	Foundation seed canola (or farmer saved seed)
5 metres	400 metres

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

POLLEN MOVEMENT – CANOLA TO WEEDY SPECIES

Canola is largely (~70%) self-pollinating. However, it can be crosspollinated (by insects and wind) with other varieties of canola, and to a lesser extent, with other close relatives. Studies have shown that there is the potential for naturally occurring hybrids to form between canola and wild radish, buchan 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, buchan weed or charlock populations by backcrossing the hybrids to the weedy parent species have failed (i.e. 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 Technologies to form hybrids with them.

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 Technologies paddocks, they should be managed similarly to volunteer Roundup Ready Technologies (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.

MANAGEMENT OF VOLUNTEER CANOLA

Volunteer canola is a weed of crop and non-crop situations throughout southern Australia. The majority of Australia's canola crop is herbicide tolerant so most growers are already familiar with managing herbicide tolerant, canola volunteers. Many options currently exist for the control of volunteer canola. All these options except Roundup® branded products (or glyphosate) continue to exist for the control of Roundup Ready Technologies.

It is essential to monitor and manage the appearance of volunteer canola in both crop and non-crop situations. Depending on the circumstances, particularly any steps taken to manage emerging volunteers and to limit the potential persistence or development of a seed bank, volunteers may be found for a number of years after growing the crop and should be controlled prior to flowering. The following situations must be assessed for the presence of volunteers:

- In a paddock where Roundup Ready Technologies have been grown.
- In a paddock immediately adjacent to where Roundup Ready Technologies have been grown.
- In areas where there has been seed or grain spillage during transport (e.g. 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.

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.

Any plants present in a paddock that may be suspected to be Roundup Ready Technologies 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.

To find your local Bayer representative,
visit **crop.bayer.com.au**

roundupreadycanola.com.au
truflex.com.au

Reference: 1. Rieger, M.A. Lamond, M. Preston, C . Powles, S .B. and Roush, R.T. (2002). Pollen-Mediated Movement of Herbicide Resistance Between Commercial Canola Fields. Science. Vol. 296. no. 5577, pp. 2386–2388.

Disclaimer: Always read and follow the directions and precautions on the label for Roundup Ready® Herbicide with PLANTSHIELD, Roundup Ready® PL Herbicide with PLANTSHIELD Technology, Roundup Ready® canola and TruFlex® canola, and any other special conditions that may accompany the License and Stewardship Agreement. All the information provided in this plan 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 Technologies contain genes that confer tolerance to glyphosate, the active ingredient in Roundup Ready Herbicide with PLANTSHIELD. Roundup Ready Herbicide with PLANTSHIELD and Roundup Ready PL Herbicide with PLANTSHIELD Technology 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 and Tasmania. 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.

Monsanto Australia Pty Ltd (ABN 86 006 725 560)
Level 1, 8 Redfern Road, Hawthorn East VIC 3123
Email: canola@monsanto.com

BAYER

TruFlex® CANOLA

Roundup Ready® CANOLA

GUIDELINES FOR A SUCCESSFUL IWM STRATEGY TO REDUCE RESISTANCE RISKS:

- Aim to enter the TruFlex and Roundup Ready canola cropping phase of the rotation with a **low weed burden.**
- Integrate as many different weed control options **(chemical and cultural)** as possible through all phases of the crop rotation.
- Make every herbicide application count – use **registered rates** at the correct application **growth stage** and assess effectiveness.
- Rotate herbicides with **different modes of action** throughout the crop rotation.
- Regularly **monitor the effectiveness** of resistance management practices.
- **Test weed populations** for herbicide resistance status as part of ongoing integrated weed management.
- If planting into a paddock with suspected glyphosate resistance, growers must have a **plan to manage such weeds**.

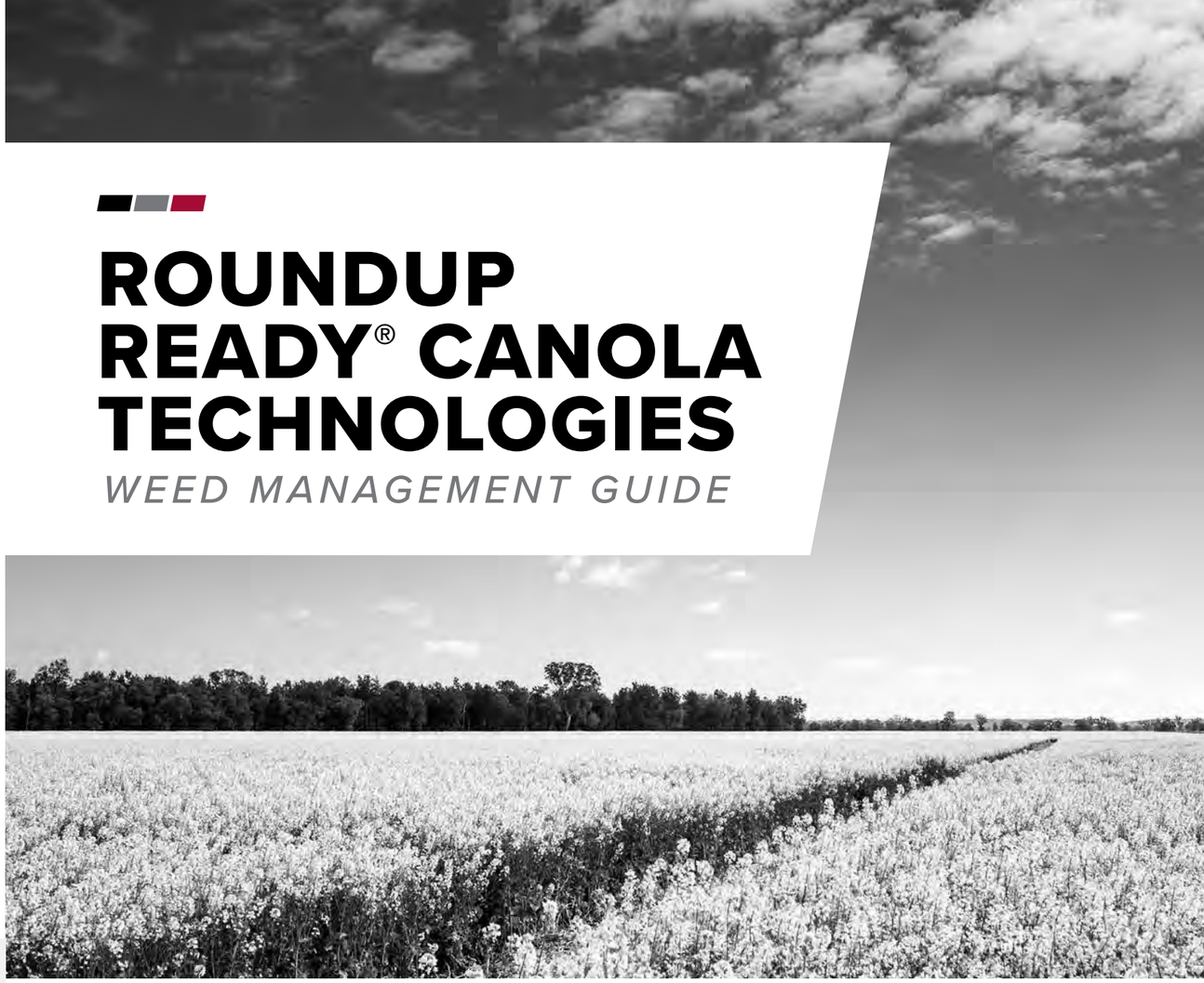
For information on integrated weed management visit **weedsmart.org.au**

To find out more about TruFlex canola and Roundup Ready canola visit **roundupreadycanola.com.au** or to find your local representative visit **crop.bayer.com.au/contact-us**

Monsanto Australia Pty Ltd (ABN 86 006 725 560)
Level 1, 8 Redfern Rd, Hawthorn East VIC 3123
Phone: 1800 804 479
crop.bayer.com.au

ROUNDUP READY® CANOLA TECHNOLOGIES

WEED MANAGEMENT GUIDE



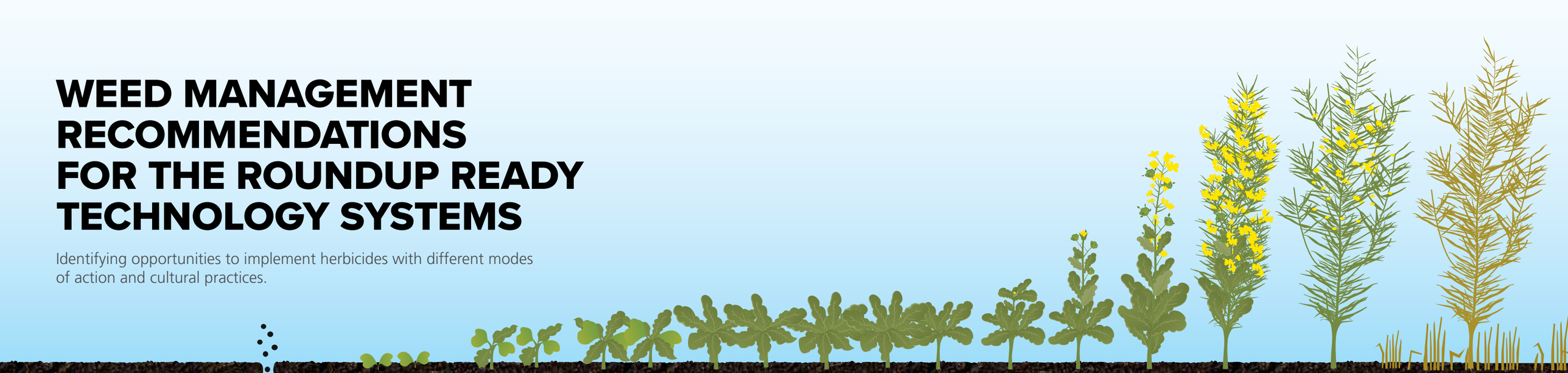
TruFlex® canola with Roundup Ready® Technology and Roundup Ready® canola (Roundup Ready Technologies) give growers superior weed control, excellent crop safety and the ability to increase yield potential. However, over-reliance on glyphosate before, during and after the canola crop will increase the chance of resistance developing on a grower's farm.

There are a range of herbicides with different modes of action to glyphosate, which can be used in TruFlex and Roundup Ready canola crops and in a winter cropping rotation. By adding targeted use of one or more of these alternative herbicides and cultural practices, growers can maintain excellent weed control while reducing the risk of glyphosate resistance developing on their farm, saving time and money in the future. We've listed clear recommendations for weed control practices in both TruFlex and Roundup Ready canola crops as well as for post-harvest weed and volunteer control.

Growers need to contact their consultant regarding their planned weed control program as the following information is a guide only. For more information on herbicide resistance visit **mix-it-up.com.au** and **weedsmart.org.au**

WEED MANAGEMENT RECOMMENDATIONS FOR THE ROUNDUP READY TECHNOLOGY SYSTEMS

Identifying opportunities to implement herbicides with different modes of action and cultural practices.



PRE-PLANT

Grass and Broadleaf Weeds
- Roundup Ultra® MAX
- Spray.Seed® 250
- Gramoxone®
- Alliance®

Broadleaf Weeds
- Goal™
- Ecopar®
- Amicide® Advance 700
- Estercide® Xtra
- Basta®
- Kamba® 750
- Lontrel® Advanced

Refer to herbicide labels for canola plantback period

AT PLANTING

Grass and Broadleaf Weeds
- Roundup Ultra® MAX
- Spray.Seed® 250
- Gramoxone®

Annual Ryegrass
- TriflurX®
- Butisan®
- Rustler®

Wild Oats
- TriflurX®
- Avadex® Xtra

Toadrush
- Dual Gold®

Capeweed/ volunteer legumes
- Hammer®

Hard to control broadleaf weeds eg. Marshmallow
- Hammer®

COTYLEDON

Grass and Broadleaf Weeds
- Roundup Ready® Herbicide with PLANTSHIELD®
- Roundup Ready® PL Herbicide with PLANTSHIELD® Technology

2 TRUE LEAF

Grass and Broadleaf Weeds
- Roundup Ready® Herbicide with PLANTSHIELD®
- Roundup Ready® PL Herbicide with PLANTSHIELD® Technology

Annual Ryegrass
- Verdict™ 520
- Select™

Wild Oats
- Verdict™ 520
- Select™

Capeweed/ volunteer legumes
- Lontrel® Advanced

4 -6 TRUE LEAF

Grass and Broadleaf Weeds
- Roundup Ready® Herbicide with PLANTSHIELD®
- Roundup Ready® PL Herbicide with PLANTSHIELD® Technology

Annual Ryegrass
- Verdict™ 520
- Select™
- Factor®

Wild Oats
- Verdict™ 520
- Select™
- Factor®

Capeweed/volunteer legumes
- Lontrel® Advanced

8 TRUE LEAF

Annual Ryegrass
- Verdict™ 520
- Select™
- Factor®

Wild Oats
- Verdict™ 520
- Select™
- Factor®

Capeweed/ volunteer legumes
- Lontrel® Advanced

BEFORE BUD FORMATION

Annual Ryegrass
- Verdict™ 520
- Select™
- Factor®

Wild Oats
- Verdict™ 520
- Select™
- Factor®

COTYLEDON TO FIRST FLOWER

TruFlex® canola only

Grass and Broadleaf Weeds
- Roundup Ready® Herbicide with PLANTSHIELD®
- Roundup Ready® PL Herbicide with PLANTSHIELD® Technology

70% OF PODS YELLOW

Grass and Broadleaf Weeds
- Reglone®

20% OF SEED BROWN/BLACK

Grass and Broadleaf Weeds
- Roundup Ultra® MAX

POST-HARVEST

Grass and Broadleaf Weeds
- Roundup Ultra® MAX
- Spray.Seed® 250
- Gramoxone®

Roundup Ready® canola volunteers and Broadleaf Weeds
- Hammer®
- Amicide® Advance 700
- Sharpen®

CULTURAL MANAGEMENT OPTIONS INCLUDING:

Burning and grazing crop residues, Harrington Seed Destructor and Chaff Carts

It is important to target all surviving weeds after harvest. The timely use of cultural practices can be a key IWM tactic in a canola system.

Trade name	Group	Active Ingredients	Company
Factor®	A	250 g/kg butroxydim	Nufarm
Select®	A	240 g/L clethodim	Sumitomo
Verdict™ 520	A	520 g/L haloxyfop	Corteva
Rustler® 900 WG	D	900g/L propyzamide	FMC
TriFlurX®	D	480 g/L trifluralin	Nufarm
Ecopar®	G	20 g/L pyraflufen ethyl	Sipcam Pacific
Sharpen®	G	700 g/kg saflufenacil	BASF
Goal™	G	240 g/L oxyfluorfen	Dow
Hammer®	G	400 g/L carfentrazone-ethyl	FMC
Amicide® Advance 700	I	700 g/L 2,4-D	Nufarm
Estercide® Xtra	I	680 g/L 2,4-D	Nufarm
Kamba® 750	I	750g/L dicamba	Nufarm
Lontrel® Advanced	I	600g/L clopyralid	Corteva
Avadex® Xtra	J	500 g/L tri-allate	Nufarm

Trade name	Group	Active Ingredients	Company
Dual Gold®	K	960 g/L s-metolachlor	Syngenta
Butisan®	K	500 g/L metazachlor	BASF
Gramoxone®	L	250 g/L paraquat	Syngenta
Reglone®	L	200 g/L diquat	Syngenta
Spray.Seed® 250	L	135 g/L paraquat, 115 g/L diquat	Syngenta
Roundup Ultra® MAX	M	570 g/L glyphosate	Bayer/Sinochem
Roundup Ready® Herbicide with PLANTSHIELD®	M	690 g/kg glyphosate	Bayer/Sinochem
Roundup Ready® PL Herbicide with PLANTSHIELD® Technology	M	540 g/kg glyphosate	Bayer
Basta®	N	200 g/L glufosinate-ammonium	BASF
Alliance®	Q&L	250 g/L amitrole + 125 g/L paraquat	Nufarm

Refer to manufacturer's website for labels.

BAYER TruFlex CANOLA Roundup Ready CANOLA Roundup Ready PLANTSHIELD Roundup READY PL HERBICIDE MIX IT UP WEED smart every weed every seed every farm every year

GUIDELINES FOR A SUCCESSFUL IWM STRATEGY TO REDUCE RESISTANCE RISKS:

- Aim to enter the TruFlex and Roundup Ready canola cropping phase of the rotation with a **low weed burden.**
- Integrate as many different weed control options **(chemical and cultural)** as possible through all phases of the crop rotation.
- Make every herbicide application count – use **registered rates** at the correct application **growth stage** and assess effectiveness.
- Rotate herbicides with **different modes of action** throughout the crop rotation.
- Regularly **monitor the effectiveness** of resistance management practices.
- **Test weed populations** for herbicide resistance status as part of ongoing integrated weed management.
- If planting into a paddock with suspected glyphosate resistance, growers must have a **plan to manage such weeds**.

For information on integrated weed management visit **weedsmart.org.au**

To find out more about TruFlex canola and Roundup Ready canola visit **roundupreadycanola.com.au** or to find your local representative visit **crop.bayer.com.au/contact-us**

Monsanto Australia Pty Ltd (ABN 86 006 725 560)
Level 1, 8 Redfern Rd, Hawthorn East VIC 3123
Phone: 1800 804 479
crop.bayer.com.au

BAYER

TruFlex® CANOLA

Roundup Ready® CANOLA

THE CLEARFIELD® SYSTEM AND STEWARDSHIP

Clearfield® and Clearfield® Plus crops are highly valuable tools for Australian growers to optimise production in several grain crops such as barley, canola and wheat varieties. Herbicide-tolerant Clearfield® and Clearfield® Plus crops simplify control of hard-to-kill weeds with high yielding varieties.

The Clearfield® and Clearfield® Plus Production Systems combine:

- High yielding, herbicide-tolerant varieties from Australia's leading plant breeders and seed companies.
- Custom-designed Clearfield® herbicides for knockdown and residual weed control.
- Clearfield® stewardship program.
- Clearfield® canola varieties: tolerant to and registered for OnDuty® herbicide & Intervix® herbicide.

These registrations enable growers to control over 40 weed species including annual ryegrass, brome grass, barley grass, volunteer cereals, climbing buckwheat and wild oats. Hyola® XC technology contains BASF's Clearfield® technology and is therefore managed under the Clearfield® stewardship program..

BASF is committed to delivering a high-quality Clearfield® Production System that helps deliver maximum yield potential and remains effective for the long term. Stewardship guidelines exist for both the seed and chemistry, ensuring high seed quality and purity, as well as adequate crop tolerance to Intervix® herbicide.

Clearfield® crops were introduced into Australia in 2000, with Clearfield® canola being the first crop. Since then, Clearfield® wheat, Clearfield® maize, Clearfield® Plus wheat and Clearfield® barley have been added to the portfolio of crops.

With the growing of Clearfield® Production System crops comes the responsibility of all parties (BASF, seed breeders, Clearfield® agencies, Clearfield® accredited agronomists and growers) to manage the sustainability of the Clearfield® Production System.

Chemistry stewardship is equally important and we recommend four key agronomic good practices be followed for all Clearfield® crops. Clearfield® Production Systems provide a clear route to high-yielding, high-quality and ultimately, more profitable crops. In order to achieve these four key agronomic practices, BASF recommends:

- Always follow product label directions. Application timing is essential for optimum weed control and hence managing resistance via minimising weed seed production.
- Apply no more than two (2) Group B herbicides in any four (4) year period on the same paddock-this strategy will slow the development of resistance. Consideration should be given to less frequent use to delay the onset of resistance development. This includes the use of Group B herbicides both within the Clearfield Production System and in conventional crops.
- Where it is possible, care should be taken to avoid applications of Group B herbicides in consecutive years unless at least two years' previous good weed control has been achieved with methods other than Group B herbicides. Years where no Group B herbicide is used will slow the development of resistance.
- Use of Group B herbicides in either summer crops or fallow is equivalent to a pre-emergent application and further Group B applications should not be made.
- Farming practices, herbicide and crop rotations should be developed, which allow for the use of alternative mode of action herbicides or methods of weed control.
- When using crops with Clearfield and Clearfield Plus technology, consideration should be given to the use of pre-emergence herbicides. Consultation with an accredited agronomist regarding this use should be undertaken, particularly in situations where moderate to heavy ryegrass populations exist or where Group B resistance is suspected.
- Where Group B resistance is suspected within a weed population, testing of the relevant weeds should be carried out prior to the use of crops in the Clearfield or Clearfield Plus Production System.
- Integrated Weed Management should be undertaken on a paddock-by-paddock basis. Specific paddock planning should take into consideration the history of the paddock as well as the future use options.
- Resistance management guidelines for other herbicide mode-of-action groups should also be taken into account when developing and planning rotations.

Pacific Seeds advocates the preservation of Australia's canola herbicide production systems through the correct selection and application of canola production systems. Part of any sustainable farming practice involves good stewardship, and adapting to new farming practices and technologies, especially with regards to integrated weed management (IWM).

The stewardship principles for Hyola® XC Technology fully align with the broader Clearfield® Stewardship System, with further details provided in the sections below of this guide.

Pacific Seeds also recommends that no more than two (2) Group B herbicides are applied in any four (4) year period on the same paddock as this is an important component of the Clearfield® stewardship program, and where possible, care should be taken to avoid applications of Group B herbicides in consecutive years unless at least two years' previous good weed control has been achieved with methods other than Group B herbicides. Pacific Seeds also encourages any person applying pesticides to keep accurate records of all herbicide usage.

Reducing the weed burden can increase yields, reduce production costs, protect the integrity of Australia cropping systems, protect grain from marketing risks both domestically and export (i.e. weed seed contamination), and increase the sustainability of grain production in Australia.

Through Pacific Seeds leadership in developing new and novel canola herbicide technologies, we can provide our growers with increased options and flexibility..."more tools in the tool box" so to speak...during the canola phase of their cropping rotation. This aligns well with the industry WEEDSMART's "The Big 6" basis for an IWM program (https://weedsmart.org.au/the big-6/), which can be summarised as followed:

1. ROTATE CROPS AND PASTURES: Use double break crops, fallow and pasture phases to drive the weed seedbank down over consecutive years.
2. DOUBLE KNOCK – TO PRESERVE GLYPHOSATE: Follow glyphosate with a high rate of paraquat to control survivors in a fallow or pre-sowing situation.
3. MIX AND ROTATE HERBICIDES: Rotate between herbicide groups; Use different groups within the same herbicide mix; Always use full rates.
4. STOP WEED SEED SET: Crop top canola, pulses and feed barley (APVMA APPROVAL NO.: 62723/114765) in weedy paddocks; Consider hay, brown manure or long fallow in high-pressure paddocks; Spray top/spray fallow pasture prior to the cropping phase.
5. CROP COMPETITION: Adopt at least one competitive strategy (but two is better), including reduced row spacing, higher seeding rates, east-west sowing and competitive varieties.
6. HARVEST WEED SEED CONTROL: Capture weed seed survivors at harvest using chaff lining, chaff tramlining, chaff carts, narrow windrow burning or integrated weed seed destructors.

HYOLA® XC HERBICIDE APPLICATIONS & TIMINGS - CLEARFIELD CHEMISTRY

Clearfield® chemistry applied in the XC canola:
Apply to canola crop at the 2 to 6 leaf stage. Apply to actively growing weeds in the 3-leaf to 2-tiller stage and broadleaf weeds in the 2 to 6 leaf stage.

DO NOT apply Clearfield® chemistry after 6 leaf stage.

It is important that Clearfield® chemistry is applied as per the label recommendations to ensure weed species are either controlled or suppressed. To achieve the best result with Clearfield® chemistry the following is recommended:

- Apply only to actively growing weeds which are not stressed.
- Apply in a minimum water volume of 70L/ha.
- Apply as early as possible within the application window to maximise efficacy (see Application Timings).

RESISTANCE MANAGEMENT & IWM CONSIDERATIONS

To preserve the effectiveness of any herbicide a good resistance management approach is recommended. Intervix® herbicide is a Group B herbicide. Other group B (ALS inhibitors) include sulfonylureas, and triazolopyrimidines (sulphonamides). To assist with resistance management, rotate Clearfield® winter crops with spring crops to break the cycle of winter annual weeds and allow the use of alternate site of action herbicides. If winter cropping is rotated with a fallow season, control weeds before they set seed and use alternate mode of action herbicides. ALS-inhibiting herbicides should not be used more than 2 out of 4 years.

The rapid development of more Imidazolinone-tolerant crops over the past 25 years, has seen the application and use of Imidazolinone herbicides become very widespread. Winter crops such as wheat, barley, canola, and lentils have been bred to be tolerant to Imidazolinone herbicides, as well as summer crops including maize, newly released grain sorghum, and soon to be released sunflowers.

On top of this are naturally tolerant legume crops and pastures such as Field peas, mung beans, faba beans, chickpeas, peanuts, soybeans, Lucerne, serradella and subterranean clover. With such a wide use possibility, the possibility for widespread weed resistance is very real for Imidazolinone herbicides. Combined with the fact that weeds that are resistant to other Group B chemistry such as the sub-group Sulfonyl Ureas (Glean®, Logran®, Ally® etc.) can become cross-resistant to the sub-group Imidazolinone without being exposed to those herbicides.

In order to protect the integrity of Imidazolinone herbicides and reduce the risks of resistance developing, BASF recommends that Group B herbicide use is limited to twice in every four-year period per paddock, and to thoroughly control any surviving weeds.

In conjunction with this, a sound IWM strategy utilizing alternative modes of action across pre-emergent, post emergent and fallow application in different crops should be adopted, along with non-herbicide control measures such as harvest weed seed control (chaff carts, seed destructors, narrow windrow burn, chaff lining, Chaff baling etc.). Also consider a tank mix with non-ALS mode of action herbicide at full label rates for in-crop weed control.

IMI GROUP B - RESISTANCE MANAGEMENT CYCLES

Group B herbicides are very handy tools in the weed control toolkit, but weeds can evolve resistance relatively quickly to their mode of action.

To keep these herbicides as an option, and to maximise the benefits of imi-tolerant crops, it is essential they be used correctly within farming systems.

BASF suggests that it is easy for growers to get caught up in the imi-cycle of using imi-tolerant crops to avoid plant-back issues with imi residuals in the soil. The problem arises when an imi-tolerant crop is sown to avoid imi residues from the previous crop or fallow, but then the grower also wants to use the imi chemistry in the crop,

This leads very quickly to over-use of the imi herbicides, and research has shown that as few as four applications of group B herbicides (to which imi herbicides belong) to the same population of weeds can result in the selection of resistant individuals, so resistance can evolve within a very short period of time.
In Australia there are four imidazolinone or 'imi-type' active ingredients registered to control a variety of grass and broadleaf weeds in crops and fallow.

These actives are imazamox (e.g. Intervix®*, Raptor®), imazapic (e.g. Bobcat I-Maxx®*, Flame®, Midas®*, OnDuty®*), imazapyr (Arsenal Xpress®*, Intervix®*, Lightning®*, Midas®*, OnDuty®*) and imazethapyr (Lightning®*, Spinnaker®).

The other types of herbicides in Group B are the pyrimidinylthiobenzoates, sulfonylureas (SUs) and triazolopyrimidines herbicides. They all inhibit the plant's production of specific essential proteins.
Use the WeedSmart Big 6 to develop an integrated weed control program that keeps Group B herbicides as a viable option well into the future.

How do Group B herbicides work?

Short answer: The Group B herbicides, including the imis, interfere with the activity of the ALS enzyme that is used in the production of certain essential plant proteins.

Longer answer: The Group B mode of action is to inhibit the production of the acetolactate synthase (ALS) enzyme in the plant cells. This enzyme is needed to produce essential plant proteins. By inhibiting ALS production, a foliar herbicide application causes the plant to deplete its supplies of the essential proteins and the plant will slowly die, often taking about three weeks. Group B herbicides with residual activity inhibit the production of amino acids so the plant uses up the reserves in the seed as it germinates and is exhausted before it breaks through the surface of the soil.

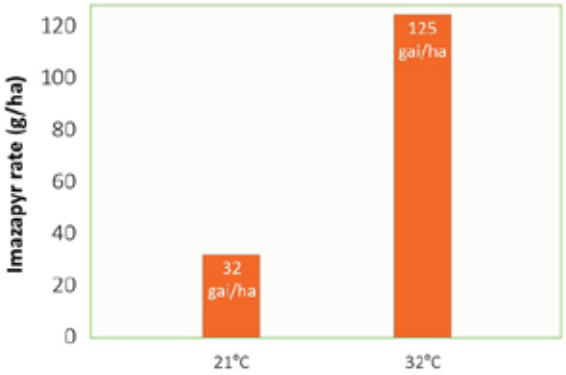
Whether using Group B herbicides as a pre-emergent, or post-emergent application; consider the use of registered tank mixes with herbicides from other modes of action.

What conditions do Group B herbicides need to work best?

Short answer: Small weed size is critical for effective foliar application. Imis will not kill older weeds, so applying these herbicides to large weeds is a waste of money.

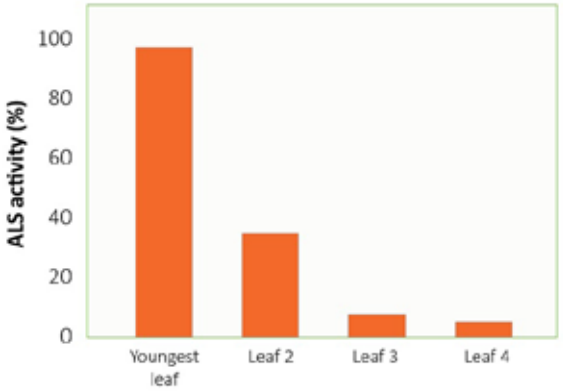
Longer answer: ALS concentration is highest in young plant tissue and so Group B herbicides are most effective when plants are small and actively growing. When plants are moisture-stressed there will be reduced uptake and translocation of foliar-applied imis. Uptake of imis is very sensitive to high temperatures. In summer, temperatures in the 30s will require much more active ingredient for the same level of control achieved at lower temperatures. Follow the label instructions.

There is a wide range of soil characteristics and environmental conditions that affect the efficacy of soil-applied Group B herbicides.



Affect of temperature on efficacy

- Environmental conditions such as temperature and relative humidity are the most significant factors affecting efficacy.
- Hot, dry conditions are the biggest influence, causing more rapid drying of the spray deposit and will also impact on the potential translocation.
- The chart shows that the rate required to give the same level of control (90% control if Cyperus) was significantly higher at 32°C than that at 21°C.



Importance of weed size

- Imidazolinone activity inhibits the ALS enzyme
- Control is better in younger, more rapidly growing plants.
- If the herbicide doesn't reach the growing points, activity is reduced.

Source: The Imidazolinone Herbicides (Shaner and O'Conner) 1991

GROUP B USE PATTERNS & PLANT-BACK REQUIREMENTS

What are recommended Group B use patterns?

Short answer: Apply no more than two (2) Group B herbicides in any four (4) year period on the same paddock and choose the right product for the situation.

Longer answer: A Group B herbicide application in either a summer crop or summer fallow is equivalent to a winter crop pre-emergent application, so no further Group B applications should be made in that paddock, that year. Use Group B herbicides strategically, if you use imazapic (Flame) in the summer fallow and Ally, Logran, Atlantis or Intervix (for imi-tolerant cereals) over the top of your cereal crop in the winter, you then need to wait three years before using any other Group B chemistry in that paddock.

If you are planting imi-tolerant varieties to get around an imi residue problem, do not use imi chemistry over the top – it's not good practice for resistance management and you will get stuck in the imi-cycle!

Always read and follow label instructions.

GROUP B HERBICIDE PLANT-BACK REQUIREMENTS

What are my options if there's sufficient planting rain but the plant-back requirements for the Group B herbicide haven't been met?

Short answer: Consider planting a Clearfield or imi-tolerant crop but try to avoid using imis or other Group Bs in-crop. Imazapic (e.g. Flame) applied in a summer fallow is cheap and effective, but it will have implications for crop rotation flexibility.

Longer answer: Imis have a broad range of soil binding characteristics and the period of residual decay varies markedly. Microbial activity is the primary mechanism for breakdown of soil-applied imis.

Consequently, soil moisture and temperature play an extremely important role in how long the herbicide remains effective in the soil and when it is safe to plant a sensitive crop.

Even if the residual has not broken down sufficiently to safely plant sensitive crops, there may be poor weed control due to sub-lethal amounts of herbicide remaining in the soil. This scenario represents a serious risk of partially resistant weeds setting seed. Other weed control options must be set in place to control weed escapes.

While Clearfield and imi-tolerant crops are the most tolerant crops available, there are several non-Clearfield crops, such as chickpea, field pea, mungbean, peanut and soybean that have a degree of natural tolerance to imi herbicides.

Look for a safe option that also enables the use of non-Group B herbicides and or cultural methods to manage weeds in-crop. If you need to use a pre-emergent, be sure to choose from an alternative herbicide MOA group.

Source: WeedSmart

MANAGING HERBICIDE CARRYOVER EFFECTS

Some herbicides can remain active in the soil for weeks, months or years. This can be utilised to a grower's advantage as it can provide greater long term weed control. However, if the herbicide stays in the soil longer than intended it may create issues for future crops or pastures that may be sensitive to those herbicide residues in subsequent years.

A common example is group B Sulfonyl Urea ("SU") or Imidazolinone ("Imi") is used in wheat or barley (CL Wheat or CL Barley for Imi), it can remain active in the soil for several years and damage non-tolerant legumes and oilseeds, particular in low rainfall farming regions, and high pH soils for SU's (pH>7), and low pH soils for Imi's (pH<7).

A problem for growers can be identifying the amount of residue that is remaining prior to planting the following crops, as the processes for herbicide breakdown can be a complex interaction of soil biology, soil pH, sunlight, rainfall and time.

Often commercial soil residue testing procedures can be too time consuming, expensive, are not able to accurately predict the amount of residue. Often the best to way to test a paddock is to take a small sample of soil from an area that would have been treated with a residual herbicide the previous season, and also take a sample from an area that was not treated with herbicide.

Keep these 2 samples separate in pots and plant some seeds of the intended crop into the pots and observe if there are any differences in establishment and early growth. This can take a few weeks so needs to be done well in advance of planting the paddock, and is not totally reliable as there are other factors that could be affecting the outcomes:

- The 'untreated' sample, whilst from the same field, may have been taken from outside the 'normal' planting/sprayed area, so may have different soil fertility, pH etc to the treated area, which may affect early plant growth of the test crop
- Rainfall/ moisture levels may be uneven across a paddock, there breakdown of herbicides may have occurred un-evenly across the paddock, so test samples may not show potential problem areas.
- On large farming operations, the collecting of multiple samples and growing in pots could become a time-consuming project.

MANAGING HERBICIDE CARRYOVER & GRAIN MRL'S

Another issue can develop after a crop has been planted, in that it can be difficult to identify residue issues confidently as other issues could be present such a nutrient deficiencies, disease or pests. Also, to further complicate the matter, the herbicide residues could actually be the primary issue and it is overlooked, as secondary issues are identified as plant nutrient deficiencies, diseases or pest damage, but the secondary issues are caused by the plant's stress tolerance being tested by the herbicide residues.

Intervix® herbicide can be used with confidence in Clearfield® barley, Clearfield® Plus wheat and Clearfield® canola.

Maximum Residue Limits (MRLs) in export destinations may be different to those in Australia. In some countries, in the absence of an established MRL a default of 0.01ppm is established. The use of Intervix® herbicide according to the label provides confidence for MRL compliance. Always use the registered product in accordance with the approved label.

Every country registers chemicals under their own regulations and according to their domestic use pattern and therefore differences between Australia and overseas MRLs may occur.

INDUSTRY RESEARCH - RIGHT RATE TO REDUCE RESIDUES

• Weed management for hard-to-kill weeds is a significant issue for grain growers
• Uptake of Imidazolinone-tolerant varieties is becoming more common, especially when farmers are working to manage brome and barley grass, which have limited chemical control options
• Imidazolinone herbicide rates must be carefully manage to reduce the risk of residue build-up in the soil, especially in dry years
• Residues can affect plant vigour and growth of non-tolerant crops
• Incorrect use can lead to resistance so careful management is required

Correct use of Imidazolinone-tolerant technology is essential to avoid negative impacts in subsequent seasons, such as herbicide residues in soil which can impair growth in non-tolerant varieties. Rural Directions, in collaboration with growers from South Australia's Lower North and with support from the Grains Research and Development Corporation, led a project which looked at the effect of imi residues in cropping systems.

"Due to the dry spring and autumn, herbicide residues were likely to show up in the 2013 growing season, providing us with a great opportunity to investigate the effects of tolerant versus intolerant varieties of wheat, barley, canola and lentils," Rural Directions' Brendan Wallis said.

The trial investigated Imidazolinone herbicide efficacy on weeds by applying over two consecutive years at varying rates. Mr Wallis said the research was of particular interest as more growers incorporated Imidazolinone-tolerant varieties into their cropping systems to combat hard to kill weeds. He believes this use must be carefully assessed, particularly in low rainfall areas.

"Results showed there were no significant differences in the establishment of tolerant versus non-tolerant varieties. However, Imidazolinone residues were found to reduce plant vigour, with non-tolerant plants showing stunted root growth plus some yellowing of leaves.
We also found that the tolerant varieties out yielded non-tolerant varieties by 5 percent in wheat, 4 percent in barley, 34 percent in canola and 13 percent in lentils."

Source: Brendan Wallis, 08 8525 3000, bwallis@ruraldirections.com https://grdc.com.au/news-and-media/news-and-media-releases/south/2014/04/imidazolinone-residues

MANAGING CLEARFIELD PLANTBACK STEWARDSHIP

Unfavourable Conditions:

If there is little or no rainfall following the use of Intervix®, consult your local BASF representative before planting non-Clearfield cereals.

In calculating rainfall received, place greater emphasis on rain received from application up to the end of Spring and less emphasis on seasonal break and summer rains.

If single isolated heavy summer, autumn falls and break rains are required to achieve rainfall targets, it may not be safe to sow non-Clearfield cereals within 10 months of application. Consult your local BASF representative for advice.

Normally safe residue levels may still affect follow crops when soil nutrition is low or marginal, when cold and very wet soil conditions prevail, or when soil pathogens or nematodes are present. As environmental and agronomic factors make it impossible to eliminate all risks associated with this product, rotational crop injury is always possible.

Managing Clearfield Plantback:

When sowing a Plantback crop soon after its minimum re-cropping interval, ensure the following steps are taken to help minimise potential crop damage:

• Conduct a root disease test
Crop effects will be magnified in the presence of root disease.

• Apply zinc to the seed
Available zinc promotes early root development.

• Delay seeding
Allowing more time will maximise potential breakdown.

• Sow at the right depth and ensure there is adequate nutrition
Promoting rapid germination and emergence will minimise risk.

• DO NOT use another Group B herbicide in the Plantback crop
Rotating modes of action reduces the potential of compounding herbicide effects.

• Avoid stress during the growing season
Stresses such as poor growing conditions or insect damage may make the crop more vulnerable to residual herbicide effects

MANAGEMENT STRATEGIES FOR CANOLA VOLUNTEERS

Using canola to control weeds as part of a balanced crop rotation can be an integral part of on farm integrated weed management (IWM).

There are several different canola herbicide technologies available to growers, and continual research means more will be become available in the future. Currently Australian canola growers have access to Triazine Tolerant, Clearfield®, Conventional, Glyphosate tolerant systems (State dependent) (Roundup® Ready and the new TruFlex®) and combinations of 2 or more technologies, such as RR+TT.

For 2019, new technologies from Pacific Seeds; Clearfield® + Triazine (CT) and TruFlex® + Triazine (XT), can be added to this list. One important factor to keep in mind, is that with new novel herbicide tolerances and combinations of tolerances, is the ability to control any volunteer canola that may germinate in subsequent crops, pasture and fallow areas.

Being aware of what herbicides are affective at controlling canola is essential in ensuring the volunteer canola doesn't become part of the weed burden.

The Australian Oilseeds Federation has published a comprehensive document on controlling canola and other brassica weeds in 2014. There are 4 key topics covered in this document that can be summarized as below:

1. Understanding volunteer canola and where it can come from: Seeds split or lost during harvest processes, incorrect use of herbicides when trying to control canola in a non-canola crop or fallow, seed movement around the farm from spillage, stock, rainwater runoff, and Low-Level Presence (LLP). LLP is where a trace amount of herbicide technology seed is found in the seed/paddock of a different herbicide technology canola.

2. Identifying and controlling volunteer canola: most canola seeds will germinate within the nest season but can germinate up to around 3 years later. Check all possible areas for volunteer canola emergence and aim to control them while they are small (prior to 4 leaf stage). In non-crop areas grazing, mowing, grading and herbicides can be used to control herbicides. Prior to crop establishment use appropriate knockdown herbicides (be aware that glyphosate is not registered to control canola) or cultivation. Within a crop, use appropriate registered herbicides.

3. Machinery hygiene and harvest management: Cleanliness of sowing equipment, trucks, harvesters, chaser bins, field bins etc. can largely prevent the distribution of canola seed beyond the paddocks it was grown. Correct timing of windrowing and harvest, as well as correct harvester set-up and operating speed, are essential to ensuring minimal harvest loss.

4. Summary: Most canola volunteers emerge the following year post a canola crop, and following canola with a cereal maximises the number of herbicide options available both pre-sowing and in-crop for effective volunteer control. Glyphosate alone may not control volunteers. Target early control (<4leaf) and use full rates of the appropriate herbicides.

To read the full report, download the article from the AOF website http://www.australianoilseeds.com/__data/assets/pdf_file/0018/9261/Canola_volunteer_control_guide_-_2014.pdf

Table A: Herbicide options to control volunteer Hyola® XC# canola in summer fallow and non-cropping situations*			
Herbicide Tolerance	Herbicide Product		
HYOLA CT#	Common Trade Names	Active Ingredient	Mode of Action
REGISTERED FOR USE	Amicide® Advance 700	2,4-D amine	I
REGISTERED FOR USE	Estercide® Xtra 680	2,4-D LVE ester	I
REGISTERED FOR USE	Spray Seed®, Revolver®	Paraquat + Diquat	L
REGISTERED FOR USE	Gramoxone® 360 PRO, Shirquat® 250	Paraquat	L
REGISTERED FOR USE	Agritone® 750, Polo® 570 LVE	MCPA	I
REGISTERED FOR USE	Amitrole T	Amitrole	Q
REGISTERED FOR USE	Alliance®	Amitrole + Parquat	L+Q
REGISTERED FOR USE	Sledge®	Pyraflufen-ethyl	G
REGISTERED FOR USE	Amitrole® T	Amitrole + ammonium thiocyanate	Q

Table B: PRE-PLANT herbicide options to control Hyola® XC# canola volunteers in winter crop situations			REGISTERED FOR USE					
Herbicide Product			Winter Crop Situation*					
Common Trade Names	Active Ingredient	Mode of Action Group	Wheat & barley	Other cereals, Triticale & Durum	Other cereals, Oats	Field peas and / or lupins	Chickpeas	Faba beans and / or lentils
Spray Seed®, Revolver®	Paraquat + Diquat	L						
Gramoxone® 360 PRO, Shirquat® 250	Paraquat	L						
Amitrole T	Amitrole	Q						
Alliance®	Amitrole + Paraquat	L+Q						
Balance® 750 WG **	Isolxaflutole	H						
Sharpen® WG	Saflufenacil	G						
Below registered Tank-mix options with the addition of Paraquat (L) #								
Amicide® Advance 700	2,4-D amine	I						
Estercide® Xtra 680	2,4-D LVE ester	I						
B-Power®	Butafenacil	G						
Sledge®	Pyraflufen-ethyl	G						
Hammer®, Nail®	Carfentrazone ethyl	G						
Terrain®, Valor®_500 WG	Flumioxazin	G						
Sharpen® WG	Saflufenacil	G						

Table C: POST-EMERGENT herbicides to control volunteer Hyola® XC# canola in winter crop situations			REGISTERED FOR USE						
Herbicide Product			Winter Crop Situation*						
Common Trade Names	Active ingredient	Mode of Action	Wheat & barley	Other Cereals, Triticale & Durum	Other cereals, Oats	Field peas and / or lupins	Chickpeas	Faba beans and / or lentils	Pasture
EARLY POST EMERGENCE									
Eliminar® C	Bromoxynil + picolinafen	C + F							
Jaguar®, Bentley®	Bromoxynil + diflufenican	C + F							
Bromicide® MA	Bromoxynil + MCPA	C + I							
Broadside®	Bromoxynil + MCPA + dicamba	C + I							
Ecopar® + Agroxone® 750	Pyraflufen ethyl + MCPA	G + I							
Unity® + Agritone® 750	Carfentrazone ethyl + MCPA	G + I							
Agritone® 750, Polo® 570 LVE	MCPA	I							
Tigrex®, T-Rex®	MCPA + diflufenican	I + F							
Velocity®	Pyrasulfotole + bromoxynil	H + C							
Precept®	Pyrasulfotole + MCPA	H + I							
Triathlon®	MCPA + bromoxynil + diflufenican	F + C + I							
Paragon®	Picolinafen + MCPA	F + I							
Flight® EC	Picolinafen + bromoxynil + MCPA	C + F + I							
LATE POST EMERGENCE									
Amicide® Advance 700	2,4-D amine	I							
Estercide® Xtra 680	2,4-D LVE ester	I							
Agritone® 750, Polo® 570 LVE	MCPA	I							

* Product label claims for control of canola volunteers in specific crop situations. ** Always refer to the product label directions of use.
# Group B herbicide options or in combination with Glyphosate herbicides may not control Hyola XC canola volunteers in following rotation crops.
*Clearfield or Glyphosate herbicide used as a standalone option is not registered for control of XC canola volunteers.

Pacific Seeds™

Growing possibilities

SUPPORTING RESOURCES

Resistance Management
CropLife Australia-Industry Stewardship-Resistance Management Website: www.croplife.org.au

Bayer Roundup Ready® Resistance Management and Best Practice
Website: http://www.roundupreadycanola.com.au/products/truflex-canola/

Clearfield® Production System
Clearfield® Stewardship Best Management Practice,
Website: www.crop-solutions.basf.com.au

Weedsmart - Every Weed, Every Seed, Every Farm, Every Year The 'Big 6' of the WeedSmart plan
Website: https://weedsmart.org.au/the-big-6/

Australian Oilseeds Federation Website
Website: http://www.australianoilseeds.com/

Australian Oilseeds Federation Canola Volunteer Control guide Website:
http://www.australianoilseeds.com/__data/assets/pdf_file/0018/9261/Canola_volunteer_control_guide_-_2014.pdf

FOR MORE INFORMATION AND TO FIND YOUR LOCAL TERRITORY MANAGER, PLEASE VISIT

pacificseeds.com.au