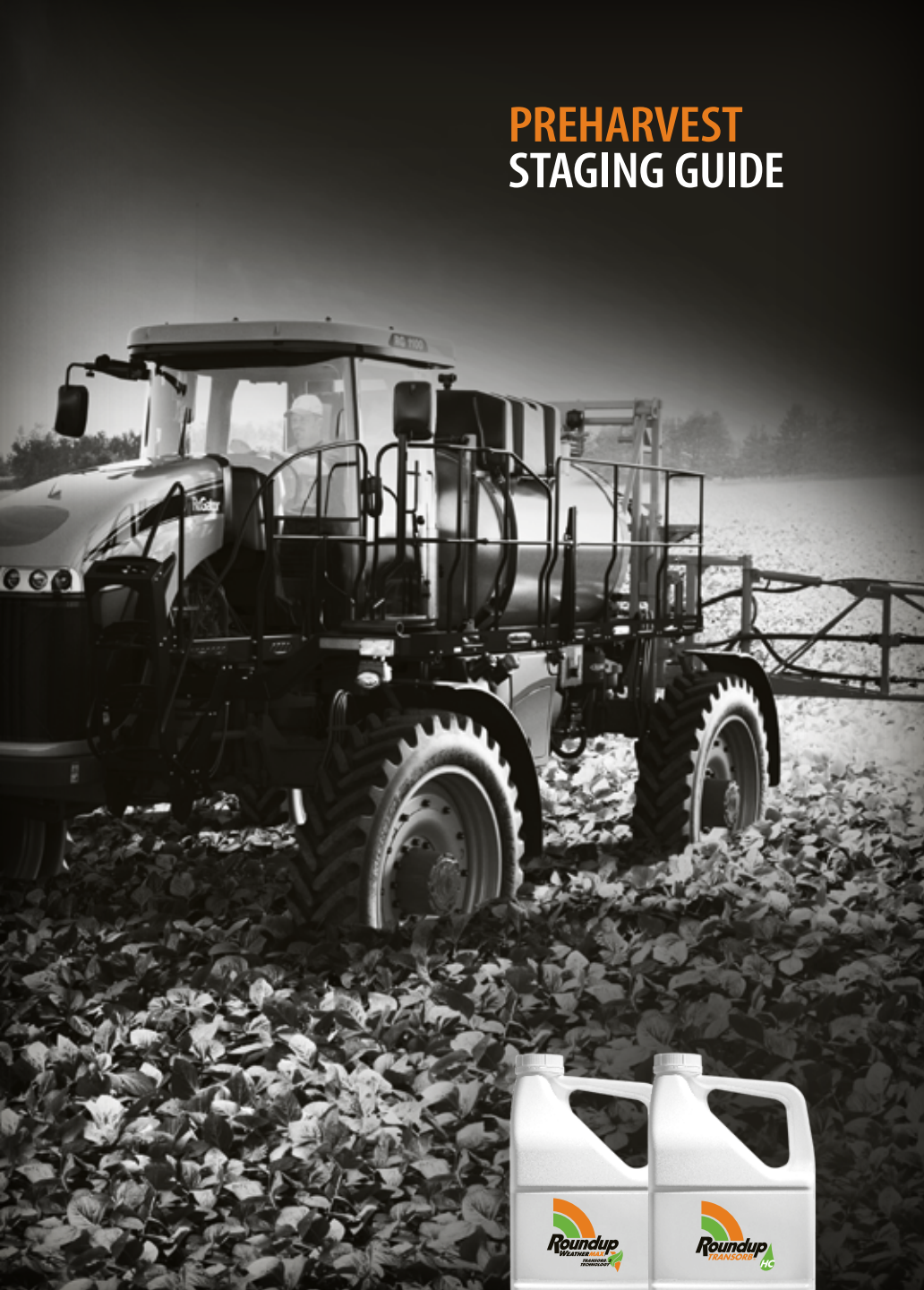
PREHARVEST
STAGING GUIDE



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Introduction

BENEFITS OF PREHARVEST

Preharvest is the best time for controlling Canada thistle, quackgrass, perennial sowthistle, dandelion, toadflax, and milkweed.

A preharvest weed control application is an excellent management strategy to not only control perennial weeds, but to facilitate harvest management and get a head start on next year's crop.

This Preharvest Staging Guide provides information on how to maximize the efficacy and benefits of Roundup WeatherMAX® and Roundup Transorb® HC herbicides in a preharvest application. The Guide is designed to help you assess weed and crop staging, and maximize your herbicide investment.

In addition to delivering the best products and technologies, we also endeavor to deliver the best information and service of any company in the field.

It is with that philosophy that we produce this guide – to help you get the most out of our herbicides.

If you have any questions about our products call Monsanto's CustomCare® line at 1 (800) 667-4944.

CUSTOMCARE
1 800 667 4944®

DID YOU KNOW?

CROP STAGING IS IMPORTANT.

Use the thumbnail test and the visual colour test to properly assess when your crop is ready to be sprayed with a Roundup® brand agricultural herbicide.

CROP STAGING

WHEAT

REGISTERED PRODUCTS

- *Roundup WeatherMAX®*
- *Roundup Transorb® HC*

CROP STAGING

Apply when the crop has 30% or less moisture content – the hard dough stage. At this stage, a thumbnail impression will remain on the kernel. This stage is typically 3 to 5 days before you would normally swath.

Wheat at proper stage for preharvest application.

Thumbnail test

TIMING OF APPLICATION

Too early for preharvest application. May reduce yield.

Optimum stage for the best, most consistent long term control of Canada thistle, perennial sow-thistle, quackgrass, dandelion, toadflax and perennial weeds.

Not too late for the best, most consistent long term control of Canada thistle, perennial sow-thistle, quackgrass, dandelion, toadflax and perennial weeds.

Optimal range for preharvest applications

FEED BARLEY

REGISTERED PRODUCTS

- *Roundup WeatherMAX®*
- *Roundup Transorb® HC*

CROP STAGING

Apply when the crop has 30% or less moisture content – the hard dough stage. At this stage, a thumbnail impression will remain on the kernel. This stage is typically 3 to 5 days before you would normally swath. Application closer to the 30% moisture content stage will result in greater harvest management benefits, such as more uniform maturity and earlier harvest.

Feed barley at proper stage for preharvest application.

SHATTERING

If you plan on swathing your crop you can help prevent shattering in susceptible varieties by spraying near the 30% seed moisture stage. This will help seed heads mature uniformly, allowing earlier swathing to minimize shattering loss. If you straight cut, shattering losses are reduced with a preharvest application because the entire crop matures uniformly. This is especially important in years when second growth would delay swathing or straight cutting.

TIMING OF APPLICATION

Too early for preharvest application. May reduce yield.

Optimum stage for the best, most consistent long term control of Canada thistle, perennial sow-thistle, quackgrass, dandelion, toadflax and perennial weeds.

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Optimal range for preharvest applications

TAME OATS

REGISTERED PRODUCTS

- *Roundup WeatherMAX®*
- *Roundup Transorb® HC*

CROP STAGING

Apply when the crop has 30% or less moisture content – the hard dough stage. At this stage, a thumbnail impression will remain on the kernel. This stage would be 3 to 5 days before you would normally swath. Application closer to the 30% moisture content stage will result in greater harvest management benefits, such as more uniform maturity and earlier harvest.

MILLING OAT RECOMMENDATION

Preharvest application of Roundup WeatherMAX® and Roundup Transorb® HC are registered for application on all oat varieties – including milling oats destined for human consumption. Please check with your oat grain purchaser prior to a preharvest application.

SHATTERING

If you plan on swathing your crop you can help prevent shattering in susceptible varieties by spraying near the 30% seed moisture stage. This will help seed heads mature uniformly, allowing earlier swathing to minimize shattering loss. If you straight cut, shattering losses are reduced with a preharvest application because the entire crop matures uniformly. This is especially important in years when second growth would delay swathing or straight cutting.

TIMING OF APPLICATION

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Optimal range for preharvest applications

CANOLA

REGISTERED PRODUCTS

- *Roundup WeatherMAX®*
- *Roundup Transorb® HC*

CROP STAGING

Apply when the crop has 30% or less moisture. At this stage, the pods are green to yellow and most seeds have turned from green to yellow or brown.

In Argentine-type canola, application closer to 30% seed moisture content will allow sufficient time for optimum weed control before swathing is required to prevent shattering. Wait 3 full days (72 hours) after application before swathing to allow thorough translocation for long-term weed control. The crop may be harvested (straight cutting or swath pick-up) 7 days after application.

Canola crop at preharvest application stage. Apply when canola has 30% or less moisture content – typically 7 to 14 days before harvest.

GREEN SEED DRYDOWN

Green canola seeds mature more quickly, resulting in earlier harvesting and better canola grades after a preharvest application.

GENUITY® ROUNDUP READY® CANOLA

If the crop is a Genuity® Roundup Ready® canola variety, the preharvest application will not provide adequate drydown of the crop. However, weed control is uncompromised and harvest management benefits will also accrue from green weed drydown.

Apply when pods are green to yellow and most seeds are yellowish to brownish.

FLAX

REGISTERED PRODUCTS

- *Roundup WeatherMAX®*
- *Roundup Transorb® HC*

CROP STAGING

Apply when the crop has 30% or less moisture. At this stage, the majority of the bolls are brown. This is the stage you would normally swath. Wait 3 full days (72 hours) after application before swathing to allow thorough translocation for long-term weed control. The crop may be harvested (straight cutting or swath pick-up) 7 days after application.

Apply Roundup brand agricultural herbicides when 75% to 80% of the bolls are brown.

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Optimal range for preharvest applications

PEAS

REGISTERED PRODUCTS

- *Roundup WeatherMAX®*
- *Roundup Transorb® HC*

CROP STAGING

Apply when the crop has 30% or less moisture content. At this stage, the majority of the pods are brown. Typically, the lower and middle pods will be brown and the seeds dry; the upper pods will be yellow and wrinkled, seed rubbery. This is the stage you would normally swath. Wait 3 full days (72 hours) after application before swathing to allow thorough translocation for long-term weed control. The crop may be harvested (straight cutting or swath pick-up) 7 days after application.

Apply Roundup® brand agricultural herbicides when peas have less than 30% moisture content.

TIMING OF APPLICATION

Too early for preharvest application. May reduce yield.

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Not too late for the best, most consistent long term control of Canada thistle, perennial sow-thistle, quackgrass, dandelion, toadflax and perennial weeds.

Optimal range for preharvest applications

LENTILS

REGISTERED PRODUCTS

- *Roundup WeatherMAX®*
- *Roundup Transorb® HC*

CROP STAGING

Apply when the crop has 30% or less moisture. At this stage, the lower-most pods (bottom 15%) are brown and the seeds rattle. This is the stage you would normally swath. Applications closer to the 30% moisture content stage will result in more harvest management benefits.

Lentils at proper stage for preharvest application.

Apply when the bottom 15% of lentil pods are brown and the seeds rattle.

SOYBEANS

REGISTERED PRODUCTS

- *Roundup WeatherMAX®*
- *Roundup Transorb® HC*

CROP STAGING

Apply when the crop has 30% or less moisture content. At this stage, stems are green to brown; pod tissue is dry and brown in appearance; 80% to 90% leaf drop. Applications closer to the 30% moisture content stage will result in greater harvest benefits.

Apply Roundup brand agricultural herbicides when stems are green to brown and there is 80% to 90% leaf drop.

Late applications can be made and still achieve good perennial weed control.

ROUNDUP READY® AND ROUNDUP READY 2 YIELD® SOYBEANS

If the crop is a Roundup Ready® soybean variety, the preharvest application will not dry down the crop. Roundup WeatherMAX® is recommended for consistent control of perennial weeds.

DRY BEANS

REGISTERED PRODUCTS

- *Roundup WeatherMAX®*
- *Roundup Transorb® HC*

CROP STAGING

Apply when the crop has 30% or less moisture content. At this stage, a majority of the pods (80% or more) are yellow to light brown in colour. The plants will also be at 80% to 90% leaf drop of original leaves. Pod colour is a better indicator than percent leaf drop because dry bean plants may begin to grow new leaves late in the fall. Applications closer to the 30% moisture content stage will result in greater harvest benefits.

Apply Roundup® brand agricultural herbicides when at least 80% of the pods are yellow to light brown.

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Optimal range for preharvest applications

DID YOU KNOW?

WEED STAGING IS IMPORTANT.

In order to properly control weeds they must be actively growing. Stresses like cold weather, previous incrop herbicide applications, pests, or drought can put stress on weeds for a short period of time. If a Roundup® brand agricultural herbicide is sprayed during this time, it will not properly translocate down to the roots and therefore not control the weeds.

WEED STAGING

WEED CONTROL TIMING

CANADA THISTLE

Spray Canada thistle at or beyond the bud stage. At this stage, thistles are generally large and actively growing with ample leaf surface, so the active ingredient is easily absorbed and thoroughly translocated to the roots and shoots for effective control. When the crop is ready to spray, thistles are usually at the ideal stage.

If you have used a Canada thistle herbicide in the spring, ensure that adequate regrowth is present and that the thistle plants are actively growing. If in doubt, talk to your local retailer, Monsanto Representative, or call Monsanto's CustomCare® line at 1 (800) 667-4944.

The best time to control Canada thistle – at or beyond the bud stage.

PERENNIAL SOW-THISTLE

Spray perennial sow-thistle at or beyond the bud stage. At this stage, thistles are generally large and actively growing with ample leaf surface, so the active ingredient is easily absorbed and thoroughly translocated to the roots and shoots for effective control. When the crop is ready to spray, thistles are usually at the ideal stage.

If you have used a perennial sow-thistle herbicide in the spring, ensure that adequate regrowth is present and that the thistle plants are actively growing. If in doubt, talk to your local retailer, Monsanto Representative, or call Monsanto's CustomCare® line at 1 (800) 667-4944.

Perennial sow-thistle

WEED CONTROL TIMING

QUACKGRASS

When the crop is ready to spray, quackgrass is usually at the ideal stage as well. At this time of year, quackgrass is usually actively growing and has 4 to 5 or more green leaves to absorb the herbicide. This helps translocate the active ingredient throughout the plant for highly effective shoot and root control. What's more, preharvest is the earliest opportunity to control quackgrass before it competes with next year's crop.

Quackgrass should be actively growing with adequate leaf surface.

DANDELION, MILKWEED AND TOADFLAX

To control dandelion, milkweed and toadflax, weeds should be actively growing and at the bud to bloom stage of growth. This stage of growth typically occurs around the same time the crop is ready to spray. In crops with heavy crop canopies such as canola, use higher water volume (7 to 10 g.p.a.) to ensure maximum coverage.

Dandelion – a growing problem

Milkweed

Toadflax

WINTER ANNUALS

Winter annual rosettes will be controlled with a preharvest application and annual weeds in their summer vegetative growth stage will be thoroughly dried down. Use water volumes that will ensure complete coverage of rosettes that are near the soil surface and under the crop canopy.

DID YOU KNOW?

WATER QUALITY IS IMPORTANT.

Ensure the water source is suitable for spraying. When spraying a Roundup® brand agricultural herbicide, hard or dirty water can affect your weed control performance. If you're unsure of hardness, have the water tested.

BEST MANAGEMENT PRACTICES FOR APPLICATION

BEST MANAGEMENT PRACTICES FOR APPLICATION

WATER VOLUME

Roundup WeatherMAX® and Roundup Transorb® HC

A minimum of 5 gallons per acre is required to penetrate the crop canopy and to ensure good coverage of weeds and the crop. Use up to 10 gallons of water per acre when the crop canopy is heavy and weeds are sheltered by the crop – especially important if dandelions are present.

STRAIGHT CUT RECOMMENDATIONS

Swathing may be eliminated when a preharvest herbicide application is used on wheat, barley, oats, peas and flax. The crop may be straight cut 7 days after application.

If swathing after a preharvest treatment, wait 3 full days (72 hours) after application to allow thorough translocation for long-term weed control.

LIVESTOCK FEED

Crops that have been treated with a Roundup® brand agricultural herbicide in a preharvest application can be fed to livestock and the straw can be baled for livestock bedding or feed. Vines, screenings and seed can also be fed to livestock – a use registered by the Pest Management Regulatory Agency.

- **Do not apply preharvest application to crops being grown for seed production.**
- **There is one rate for preharvest: 0.67 L/acre. This provides convenience across all crops and weeds.**

POSTHARVEST OPTIONS

For low lying weeds, like dandelions, a postharvest treatment is often more effective. Applying a postharvest herbicide application, once the canopy is removed, means better coverage and better translocation, provided the weed is still actively growing.

REGISTERED CROPS AND RATES

	0.67 L/acre *1.67 L/ha*	*0.67 L/acre* *1.67 L/ha*
Wheat	O	O
Barley	O	O
Oats	O	O
Canola*	O	O
Flax	O	O
Peas	O	O
Lentils	O	O
Soybeans*	O	O
Dry Beans	O	O

**Including Genuity® Roundup Ready® varieties*

PREHARVEST GLYPHOSATE APPLICATION

IDEAL SPRAYING TIMES

Physiological maturity is the key for timing a preharvest glyphosate application. Physiological maturity is reached once seed moisture content is less than 30%.

The table below provides visual indicators of physiological maturity:

CROP	VISUAL TEST FOR <30% MOISTURE CONTENT
Wheat, Feed Barley, Oats	Hard dough stage; thumbnail impression remains on seed
Canola	Pods are green to yellow; most seeds are yellow to brown
Flax	Majority (75% - 80%) of pods are brown
Peas	Majority (75% - 80%) of pods turned colour
Lentils	Lower pods (15%) are brown; seeds rattle
Dry Beans	Stems are green to brown; pods are mature (yellow to brown); 80% - 90% leaf drop (original leaves)
Soybeans	Stems are green to brown; pod tissue is dry and brown; 80% - 90% leaf drop
Forages	3 - 7 days before last cut in final year of stand

IDEAL SPRAYING TEMPERATURES

Preharvest:

During preharvest, only apply Roundup® brand agricultural herbicides if forecasted temperatures are going to remain higher than 8-10°C for a minimum of two hours. For best results, start application in the late morning or afternoon.

Evening and early morning temperatures near freezing should not impact the performance of Roundup® brand agricultural herbicides for preharvest as cool seasonal temperatures have conditioned perennial weeds.

DID YOU KNOW?

PERENNIAL WEED CONTROL IS IMPORTANT.

Roundup® brand agricultural herbicides should not be used as a desiccant, but for perennial weed control especially on pulses. Growers often want a quick drydown of their crops and although they sprayed their fields a week ago, it still isn't ready for harvest. Roundup® brand agricultural herbicides work slower than a desiccant.

HARVEST MANAGEMENT

HARVEST MANAGEMENT BENEFITS

Growers who use Roundup® brand agricultural herbicides for a preharvest application report excellent control of thistles and other perennial weeds in addition to significant harvest management benefits*.

The 3 main harvest management benefits include:

- **EARLIER HARVEST**
  Spraying a Roundup® brand agricultural herbicide allows for uniform crop maturity which gives you the option to straight cut harvest.

- **MORE UNIFORM MATURITY**
  The maturation process of the crop occurs simultaneously.

- **INCREASED COMBINE EFFICIENCY**
  Spraying a Roundup® brand agricultural herbicide for your preharvest application allows you to straight cut harvest versus swathing and pickup.

Roundup®	Wheat	Barley	Tame Oats	Canola**	Flax	Peas	Lentils	Soybeans**	Dry Beans
Earlier Harvest	●	●	●	●	●	●		●	●
More Uniform Maturity	●	●	●	●	●	●	●	●	●
Increased Combine Efficiency	●	●	●	●	●	●		●	●

** Based on historical Monsanto survey results ** Non glyphosate tolerant varieties*

RISKSHIELD® PROTECTION PACKAGE BENEFITS

RISKSHIELD® PROTECTION PACKAGE BENEFITS

Every Roundup® brand agricultural herbicide is backed by its own unique RiskShield® protection package. This package includes comprehensive warranties and guarantees that set Roundup® brand agricultural herbicides apart from imitators and represent Monsanto's promise of industry-leading product performance and after-sales support.

ALL WEATHER WARRANTY

For the best control, the best rainfastness, and the best consistency, you have the power of an all weather warranty. And that's important because, more often than not, you're forced to spray under adverse weather conditions. If acceptable control* is not achieved after using a Roundup® brand agricultural product due to tough conditions, you're covered.

**Acceptable control is defined by commercially acceptable limits based on product registration trials.*

30-MINUTE RAINFAST GUARANTEE

If Roundup WeatherMAX® does not provide acceptable weed control due to rainfall 30 minutes or more after application, you're covered. Roundup WeatherMAX® must be used in compliance with label directions. Acceptable weed control is defined by commercially acceptable limits based on product registration trials. Monsanto will refund or credit the purchase amount up to the initial use rate of Roundup WeatherMAX® for re-treatment (640 acre maximum).

60-MINUTE RAINFAST GUARANTEE**

If Roundup Transorb® HC or Roundup Ultra2® do not provide acceptable weed control due to rainfall 60 minutes or more after application, you're covered. Roundup Transorb® HC or Roundup Ultra2® must be used in compliance with label directions. Acceptable weed control is defined by commercially acceptable limits based on product registration trials. Monsanto will refund or credit the purchase amount up to the initial use rate of Roundup Transorb® HC or Roundup Ultra2® for re-treatment (640 acre maximum).

CUSTOMCARE®

Our toll-free product inquiry line 1-800-667-4944 is available to answer your questions.

Through the CustomCare® line, you'll have access to assistance during the peak seasons. Just call **1 (800) 667-4944**. Knowledgeable, professional technicians are waiting to help.

For full details visit **www.roundup.ca.**

DID YOU KNOW?

AERIAL APPLICATION IS IMPORTANT.

When label directions are followed, aerial applications can be made with no risk of drift to non-target areas. Minimize your risk for spray drift by taking into account spray droplet size, wind speed, other environmental factors, and application equipment design.

AERIAL APPLICATION

AERIAL APPLICATION

Aerial spraying may be the only option when ground conditions are very wet as ground sprayers can leave deep tracks in your crops and may get stuck. Roundup WeatherMAX® and Roundup Transorb® HC herbicides are registered in Canada for preharvest aerial application. Always ensure you have substantial buffer zones.

Contact your local aerial applicator or the Roundup WeatherMAX® and Roundup Transorb® HC herbicide labels for more details.

DID YOU KNOW?

UNIFORM DRYDOWN ISN'T EASY.

Make sure you use the most representative part of your field when assessing the proper time to spray a Roundup® brand agricultural herbicide. Some parts of your field will be mature while other spots may be too green for a preharvest application of a Roundup® brand agricultural herbicide. Be sure to look at the whole field and not just base your judgment on one small area.

Application rates for Roundup® brand agricultural herbicides

540 g/L	10L JUG	115L SHUTTLE	450L SHUTTLE
0.33 L/ac	30 acres	349 acres	1364 acres
0.50 L/ac	20 acres	230 acres	900 acres
0.67 L/ac	15 acres	172 acres	672 acres
0.83 L/ac	12 acres	139 acres	542 acres
1.00 L/ac	10 acres	115 acres	450 acres
1.17 L/ac	9 acres	98 acres	385 acres
1.33 L/ac	8 acres	86 acres	338 acres

Give us a call and we'll do the best we can to help you understand how to apply Roundup WeatherMAX® and Roundup Transorb® HC herbicides for maximum performance, weed control and harvest management benefits. Talk to your local retailer, Monsanto Representative or call the CustomCare® line at 1 (800) 667-4944.

www.roundup.ca

CUSTOMCARE 1 800 667 4944®

MONSANTO®

Monsanto Company is a member of Excellence Through Stewardship® (ETS). Monsanto products are commercialized in accordance with ETS Product Launch Stewardship Guidance, and in compliance with Monsanto's Policy for Commercialization of Biotechnology-Derived Plant Products in Commodity Crops. This product has been approved for import into key export markets with functioning regulatory systems. Any crop or material produced from this product can only be exported to, or used, processed or sold in countries where all necessary regulatory approvals have been granted. It is a violation of national and international law to move material containing biotech traits across boundaries into nations where import is not permitted. Growers should talk to their grain handler or product purchaser to confirm their buying position for this product. Excellence Through Stewardship® is a registered trademark of Excellence Through Stewardship.

ALWAYS READ AND FOLLOW LABEL DIRECTIONS. Roundup Ready® crops contain genes that confer tolerance to glyphosate, the active ingredient in Roundup® brand agricultural herbicides. Roundup® brand agricultural herbicides will kill crops that are not tolerant to glyphosate. CustomCare and Design®, CustomCare®, Genuity®, Monsanto and Vine Design®, RiskShield®, Roundup Ready®, Roundup Transorb®, Roundup WeatherMAX®, Roundup®, and Transorb® are registered trademarks of Monsanto Technology LLC, Monsanto Canada, Inc. licensee. ©2012 Monsanto Canada, Inc.

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