

WELCOME



ROUNDUP READY® XTEND CROP SYSTEM





ROUNDUP READY 2 XTEND® SOYBEANS

- Built on the high yield potential of Roundup Ready 2 Yield® technology
- Provides tolerance to both glyphosate and dicamba

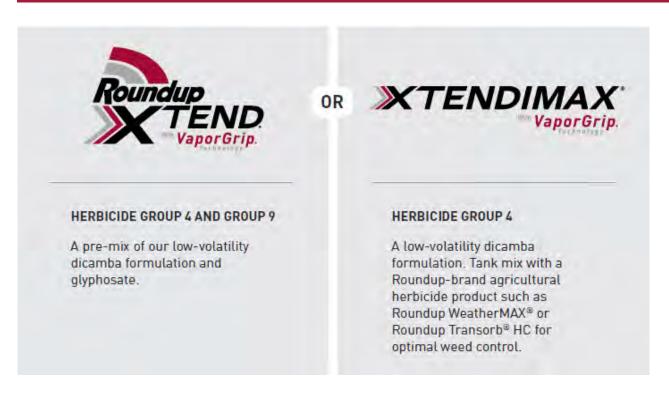








XTENDIMAX® WITH VAPORGRIP® TECHNOLOGY & ROUNDUP XTEND® WITH VAPORGRIP® TECHNOLOGY HERBICIDES



Equivalent tank mix doses of glyphosate and dicamba when applying Roundup Xtend®

Roundup Xtend [®] with VaporGrip [®] Technology	Roundup WeatherMAX® or Roundup Transorb® HC herbicide	XtendiMax [®] with VaporGrip [®] Technology	
L/ac (g/ha)	L/ac (g/ha)	L/ac (g/ha) 0.7 (600) 0.5 (450)	
2	0.9 (1200)		
1.5	0.67 (900)		
1	0.45 (600)	0.35 (300)	

- Up to 14 days soil activity* from dicamba on certain small-seeded broadleaf weeds.
- Designed specifically for the Roundup Ready® Xtend Crop System



^{*} Results may vary, depending on rainfall and soil type. For full season residual weed control, use dicamba with traditional residual herbicides that have different, effective sites of action.

INTRODUCING THE NEW 450 L TOTE FOR ROUNDUP XTEND® HERBICIDE WITH VAPORGRIP® TECHNOLOGY

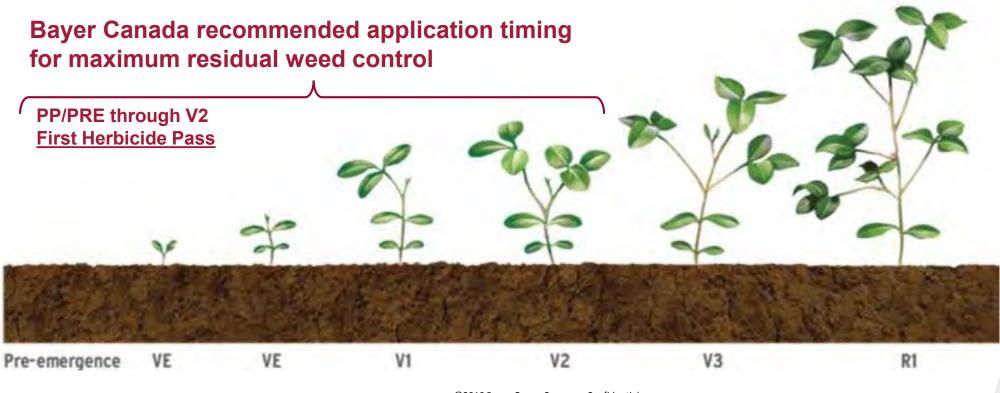


- Cover more area and help control more weeds* with the most effective premix on the market for burndown and residual weed control
- We recommend the 2 L/ac rate (high rate) as the best burndown option for no-till situations
- New tote size also available for XtendiMax[®] herbicide with VaporGrip[®] Technology



WINDOW OF APPLICATION

Application window for XtendiMax[®] herbicide with VaporGrip[®] Technology and Roundup Xtend[®] herbicide with VaporGrip[®] Technology





DICAMBA IS THE FOUNDATIONAL HERBICIDE IN THE ROUNDUP READY® XTEND CROP SYSTEM

- Provides excellent control of tough-to-manage and herbicide resistant weeds*
 - Ladysthumb
 - Lambsquarters
 - Velvetleaf
 - Wild buckwheat
 - Canada fleabane**
 - Giant ragweed**
 - Kochia**
 - Waterhemp**
- Solid weed resistance management tool when used as part of a diversified weed management program.



Roundup Xtend® with VaporGrip® Technology applied at 2 L/acre University of Guelph, Ridgetown Campus, 20 DAT (June, 2016)

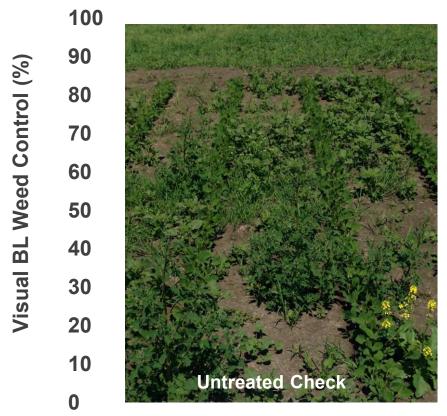


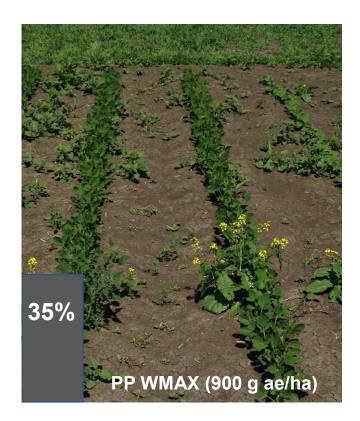
 ^{*} Source: OMAFRA Guide to Weed Control Publication 75 (2018)

 ^{**} also controls glyphosate resistant biotypes.

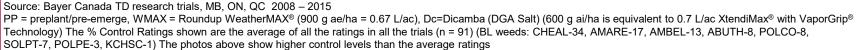
XTENDED RESIDUAL WEED CONTROL WITH XTENDIMAX® HERBICIDE WITH VAPORGRIP® TECHNOLOGY

Short term residual broadleaf weed control from dicamba applied pre-plant (weed control rated prior to POST (V3-V4) herbicide application)





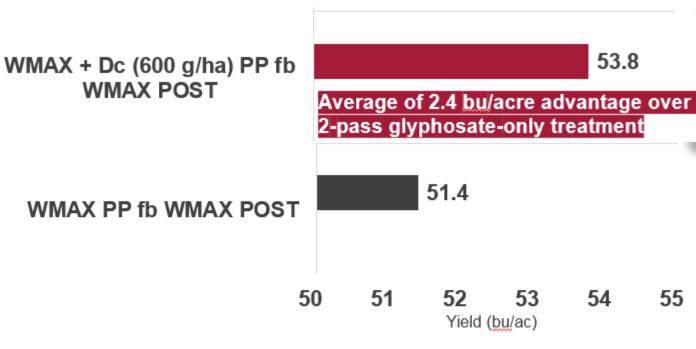






INCREASE IN YIELD POTENTIAL FROM EARLY SEASON WEED REMOVAL

Early weed removal & short-term soil residual weed control provides increased yield potential in Roundup Ready 2 Xtend® Soybeans





Bayer Canada Technology Development, Simcoe, ON. 2008

PP = preplant/pre-emerge, WMAX = Roundup WeatherMAX® at 900 g/ha (0.67 L/ac), Dc=Dicamba (DGA salt), POST = post emerge at 3rd trifoliate 600 g/ha is equivalent to 0.7 L/ac XtendiMax® with VaporGrip® Technology Source: Bayer Canada TD research trials, 2008 – 2014 (n=39)



WEEDS CONTROLLED BY ROUNDUP XTEND® HERBICIDE WITH VAPORGRIP® TECHNOLOGY (OR TANK MIX OF ROUNDUP WEATHERMAX® HERBICIDE & XTENDIMAX® HERBICIDE WITH VAPORGRIP® TECHNOLOGY)

- · annual blue grass
- annual sow thistle
- barnyard grass
- biennial wormwood
- bur cucumber
- Canada fleabane
- Canada thistle
- chickweed
- cleavers
- cocklebur
- common lambsquarters
- Common, false & giant ragweed
- corn spurry
- cow cockle
- crabgrass (smooth, large)
- dandelion

- downy brome
- Eastern black nightshade
- · fall panicum
- flixweed
- green and yellow foxtail
- · green smartweed
- hempnettle
- kochia
- ladysthumb
- mustard (hare's ear, Indian, tumble, wormseed)
- narrow leaved hawk's beard
- night flowering catchfly
- · Pennsylvania smartweed
- perennial sow-thistle
- Persian darnel
- prickly lettuce
- quackgrass
- redroot pigweed

- round-leaved mallow
- · Russian pigweed
- Russian thistle
- shepherd's-purse
- smooth pigweed
- stinkweed
- · stork's bill
- velvetleaf
- Narrowleaf vetch
- · volunteer adzuki beans
- · volunteer barley
- · volunteer canola (non-glyphosate-tolerant)
- volunteer flax
- volunteer wheat
- wild buckwheat
- wild mustard
- wild oats
- wild proso millet
- wild tomato



ROUNDUP XTEND® HERBICIDE WITH VAPORGRIP® TECHNOLOGY vs. ENLIST DUO® HERBICIDE FOR RESIDUAL WEED CONTROL







HELPS CONTROL GLYPHOSATE RESISTANT WATERHEMP*

*As part of a 2-pass system with a full PRE-treatment option followed by Roundup Xtend® herbicide with VaporGrip® Technology early post at the 2 L/ac rate.



Untreated Check



Fierce® (flumioxazin + pyroxasulfone) PRE Roundup Xtend® with VaporGrip® Technology POST



Source: Bayer Canada Technology Development and University of Guelph research trial, Essex ON, 2016

HELPS CONTROL GLYPHOSATE RESISTANT CANADA FLEABANE



Roundup Xtend® with VaporGrip® Technology (2 L/ac) plus Integrity® (150 mL/acre) – 29 DAT

Glyphosate Resistant Canada Fleabane Control:

Roundup Xtend® herbicide with VaporGrip® Technology OR XtendiMax® herbicide with VaporGrip® Technology + Roundup WeatherMAX® herbicide or Roundup Transorb® HC herbicide plus one of the following (applied PP/PRE):

- Bifecta[™]
- Eragon[®]
- Integrity[®]
- Optill®



HELPS CONTROL GLYPHOSATE RESISTANT GIANT RAGWEED



0.67 L/ac Roundup WeatherMAX® herbicide PRE



0.67 L/ac Roundup WeatherMAX® herbicide & Dicamba 600 g/ha PRE



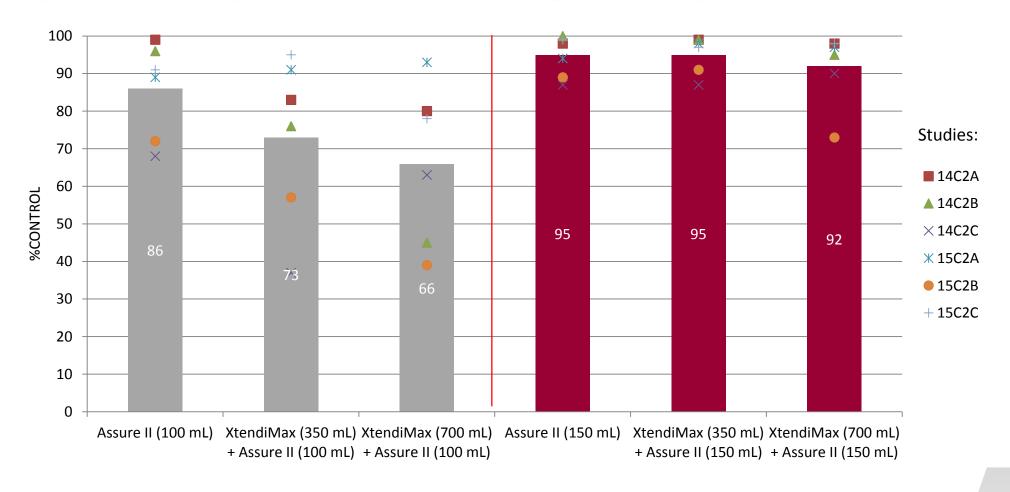


CONSIDERATIONS FOR VOLUNTEER CORN CONTROL

- Bayer Canada and University of Guelph established trials in 2014-2015 to evaluate control of volunteer corn with XtendiMax[®] herbicide with VaporGrip[®] Technology plus either Assure[®] II (quizalofop-p-ethyl) or Select[®] (clethodim), both group 1 herbicides.
- XtendiMax[®] with VaporGrip[®] Technology can antagonize volunteer corn control with group 1 herbicides.
- It is NOT recommended to tank mix Xtendimax® with VaporGrip® Technology or Roundup Xtend® with VaporGrip® Technology with a group 1 to control volunteer corn since typical timing for volunteer corn control is late post emerge in soybeans during the last herbicide application.



VOLUNTEER CORN CONTROL USING XTENDIMAX® HERBICIDE WITH VAPORGRIP® TECHNOLOGY + ASSURE® II



Bayer Canada Technology Development and University of Guelph (2014-2015), Ridgetown, Woodstock and Exeter ON, N=6 Herbicide rates reported in mL/acre

Roundup WeatherMAX® included with all treatments at 0.67 L/acre ©2019 Bayer Group Company Confidential



KEY APPLICATION REQUIREMENTS



 Use only spray nozzles that produce extremely coarse to ultra-course spray qualities (preferably Ultra Coarse)



Triple rinse clean-out is required with an ammonia-based tank cleaner



 Do not apply this product during a temperature inversion ("dead calm" conditions) as the off-target movement potential is high. In general, temperature inversions are more likely during nighttime hours.



KEY RECOMMENDATIONS FOR SUCCESS WITH THE ROUNDUP READY® XTEND CROP SYSTEM







- Apply the <u>high</u> label rate of XtendiMax[®] herbicide with VaporGrip[®] Technology along with Roundup WeatherMAX[®] herbicide <u>or</u> Roundup Xtend[®] herbicide with VaporGrip[®] Technology as part of the <u>first herbicide application</u> in the field
- Use Ultra Coarse (UC) spray quality and follow the application requirements: it is important to maintain proper operating pressure to maintain adequate pattern and droplet size
- Include an additional effective site of action when targeting glyphosate-resistant weeds for effective weed control and proper herbicide stewardship.
- For complete application requirements read and follow product labels on GenuityTraits.ca



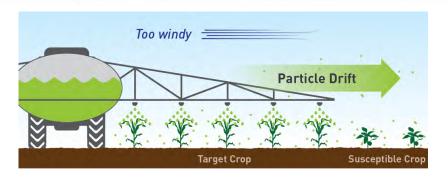
APPLICATION REQUIREMENTS: WHAT YOU NEED TO KNOW



THERE ARE THREE DIFFERENT TYPES OF OFF-TARGET MOVEMENT

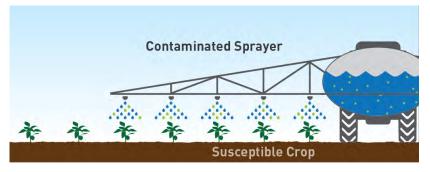
Physical Drift

Physical movement of spray particles
 DURING application. Most common and significant type of off-target movement for any herbicide



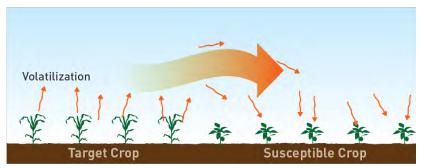
Sprayer Contamination

• Off-target movement from herbicide residue remaining in sprayer components



Volatility

 Movement of a herbicide in a volatilized form as a gas or vapor AFTER spray application. Least frequent type of offtarget movement





SPRAYER SET-UP

- The best way to reduce spray drift potential is to apply coarser spray qualities that provide sufficient coverage and weed control
 - Use only spray nozzles that produce EXTREMELY COARSE (XC) TO ULTRA COARSE (UC) SPRAY QUALITIES
 - Adjust pressure to maintain XC to UC spray qualities and do not exceed the nozzle manufacturers recommended pressures
 - Nozzle selection and pressure combined determine droplet size and percentage of driftable fines (<141 microns)
- Bayer Canada suggests the Turbo TeeJet® Induction (TTI) nozzle or other nozzles/spray systems that meet XC to UC spray qualities



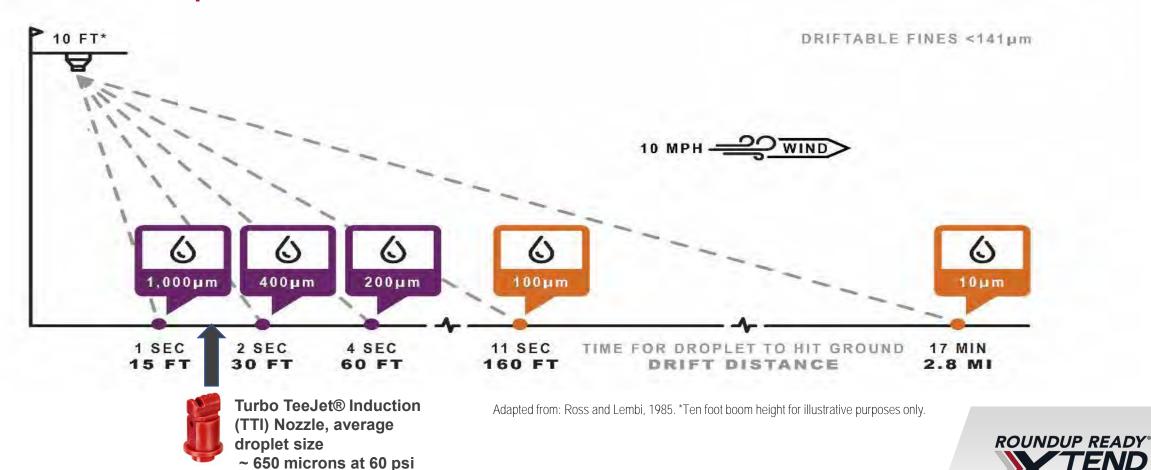
PHYSICAL DRIFT CAN CAUSE BROAD UNIFORM SYMPTOMOLOGY

Bayer Deposition Trials Predict Effects from Off-Label Nozzle Selection & Boom Height

	DROPLETS		DIST	ANCE	DRIFTABLE FINES	NOZZLES	NOZZLES
	Category	Microns	Boom Ht. 20"	Boom Ht. 50	% Fines	Туре	Туре
	UC Ultra-Coarse	> 622	50 ft.	90 ft.	< 1.5%	Turbo Ten-Jet- Induction	Turbo Tee-Jet [®] Induction (TTI)
	XC Extremely Coarse	428-62 2	69 ft.	138 ft.	1.5-3.3%	ATT J50 Tai-Jet* III) MR Wiggered A) Toa-Jet* Air induction (J09)	Hypro Ultra Low-Drift, UR & DR Wilger®, AI/AIC Tee-Jet®
Approved	VC* Very Coarse	ტტტ 349-428	108 ft.	207 ft.	3.4-5.6%	AIXR Tou-Just Orean heaf TOX L. Creen heaf	Air Bubble Jet, AIXR Tee-Jet [®] , DR Wilger [®] , Airmix Greenleaf, TDXL Greenleaf, AI/AIC Tee- Jet [®]
Not	M Medium Coarse	177-218	358 ft.	544 ft	11.7-22.3%	XR Too-Jut	XR Tee-Jet®

CONTROL THE CONTROLLABLE

Effect of droplet size over fall of 10 feet



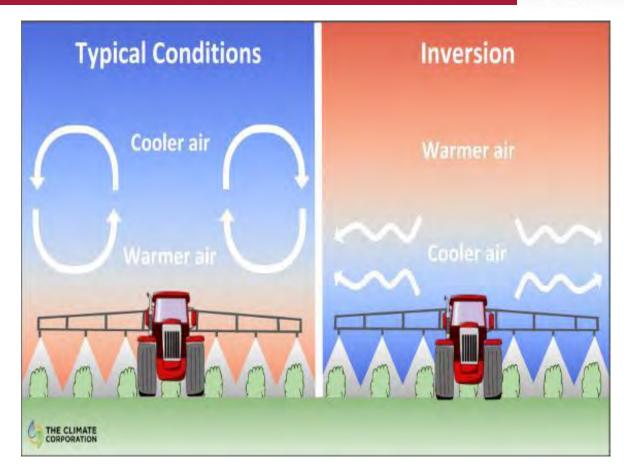
DEMONSTRATION ON IMPORTANCE OF PROPER NOZZLES

Nozzle Tip Impact on Drift APPLICATION PARAMETERS 14 DAT | 15GPA | 40 PSI **BOOMHEIGHT 24 INCHES** 2018 MONMOUTH, IL 400 FT VISIBLE CROP **SYMPTOMOLOGY DIRECTION OF TRAVEL DURING APPLICATION** TTI11004 (ULTRA COARSE)



TEMPERATURE INVERSIONS A LAYER OF COOL AIR TRAPPED BELOW A LAYER OF WARMER AIR

- During a temperature inversion, the atmosphere is very stable and vertical air mixing is restricted, which can cause small, suspended droplets to remain in a concentrated cloud which can move in unpredictable directions due to light wind.
- The inversion will typically dissipate with increased winds (>4.8 km/h) or at sunrise when the surface air begins to warm (~1.6°C from morning low)
- Symptoms of an inversion can include:
 - 'Dead calm' wind conditions
 - Ground fog in low-lying areas
 - Dew or frost present





WHICH IMAGE DEMONSTRATES A TEMPERATURE INVERSION?



VERTICAL MIXING OF AIR

Smoke test demonstration in 6-13 km/h winds at 11:00 a.m. (Nebraska)



INVERSION LAYER NEAR SURFACE

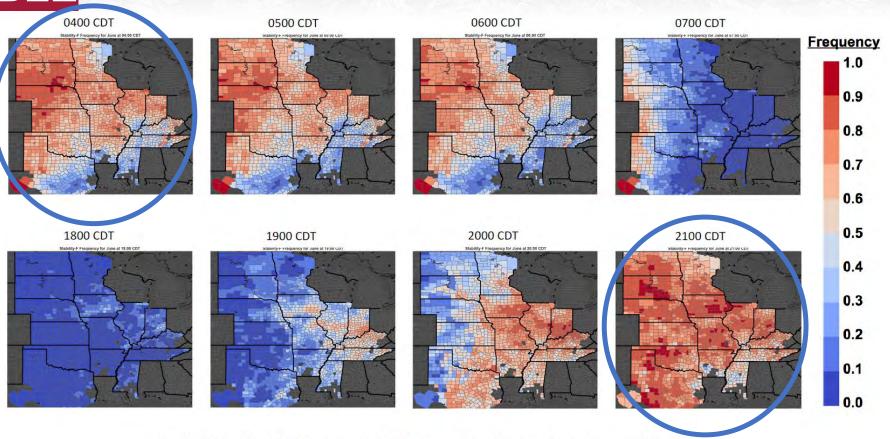
Smoke test demonstration in < 1.6 km/h winds at 7:15 a.m. (Nebraska)



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TEMPERATURE INVERSIONS – CONSISTENT & PREDICTABLE

Temperature inversions are common especially during night time hours



Stability Class-F Frequency for a given hour in June, 2017



SPRAYER SYSTEM CLEAN-OUT

Triple-Rinse Clean-Out is Required

- Properly and thoroughly clean spray equipment before & immediately after spraying dicamba per label instructions:
 - Use triple-rinse method to thoroughly clean entire sprayer system
 - Triple-rinse is the most effective practice to reduce off-target movement from spray contamination of any herbicide
 - Use a commercial based tank cleaner as part of the triple-rinse cleanout
- Sprayer parts can trap herbicide, and additives and surfactants can cling to surfaces
- Other contamination sources to be considered include nurse tanks, inductors, hoses, and connections at mixing sites





SINGLE RINSE WITH WATER OVER SENSITIVE SOYBEANS



Source: Bayer Canada Technology Development, Chatham, ON. 2014
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SECOND RINSE WITH WATER OVER SENSITIVE SOYBEANS (AFTER USING A COMMERCIAL CLEANER)







THIRD RINSE WITH WATER OVER SENSITIVE SOYBEANS



Source: Bayer Canada Technology Development, Chatham, ON. 2014



ADDITIVES AND TANK MIXTURES

 DO NOT USE the following products with Roundup Xtend® herbicide with VaporGrip® Technology or XtendiMax® herbicide with VaporGrip® Technology:

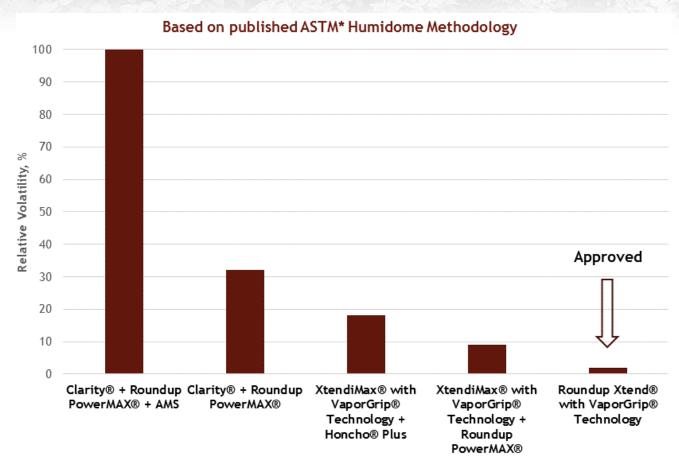


- Ammonium Sulfate (AMS) and AMS-containing adjuvants
- Sprayable fluid fertilizers or fungicides
- ANY water conditioners or buffering agents that acidify the spray solution

The use of AMS or other additives that acidify a dicamba spray solution can increase the potential for volatility



IMPACT OF AMMONIUM SULFATE ON POTENTIAL VOLATILITY



Honcho® Plus herbicide = IPA salt of glyphosate tested Roundup PowerMAX® herbicide = K salt of glyphosate tested

- Older formulations of dicamba are NOT approved for in-crop use in the Roundup Ready[®] Xtend Crop System.
- IPA glyphosate salts and Ammonium Sulfate (AMS) are NOT approved tank mixes with XtendiMax® herbicide with VaporGrip® Technology
- Utilizing Roundup Ready[®] branded products ensures compatibility and lowest potential for off target movement



Clarity® herbicide is a U.S. dicamba herbicide product. **It is registered in Canada as Banvel® II**.

Roundup PowerMAX is not approved for use in Canada. Monsanto Company St. Louis MO, 2017.

*ASTM is the American Society for Testing and Materials

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OTHER ADDITIVES AND TANK MIXTURES

- A drift reduction additive (DRA) can reduce driftable fines but is not required
 - Not all DRAs are compatible with every nozzle and pesticide/adjuvant combination
 - DRAs can create a thicker spray solution making sprayer cleanout more difficult.
 - Increased water volume is recommended if using a DRA to maintain coverage; use at least 15 GPA.
 - Need to operate in mid to upper pressure range of nozzle to maintain pattern
 - A DRA is NOT a substitute for upgrading to the proper nozzle.
- A quality non-ionic surfacant (NIS) of at least 70% active may be added at 0.25% v/v
- Bayer Canada always recommends the addition of Roundup WeatherMAX® herbicide or Roundup Transorb® HC herbicide when using XtendiMax® herbicide with VaporGrip® Technology to improve overall weed control.



OTHER KEY CONSIDERATIONS

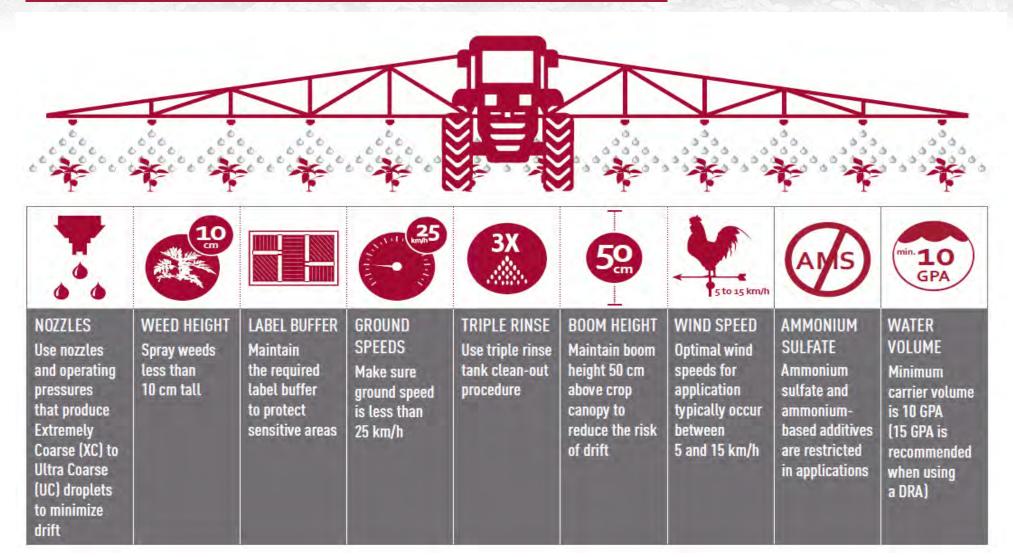
- Confirm proper herbicide resistant trait technology is in the field (Roundup Ready 2 Xtend® Soybeans)
- Application awareness
 - Survey the application site for neighboring sensitive crops
 (e.g. non-glyphosate and dicamba tolerant soybean, tomatoes, potatoes, grapes, peas, fruit trees, flowers and other broadleaf plants)
 - Talk and coordinate with neighbors where possible
- Apply to small actively growing weeds (<10 cm or 4" tall)
 - Early applications help protect yield potential
 - Smaller weeds are easier to control than big weeds
- It is recommended that speed is reduced at field edges if the applicator can maintain the required nozzle pressure and ensure proper boom height
- It is recommended to keep detailed application records including date & time of application, wind speed & direction, nozzle type, spray pressure & volume, sprayer speed, crop stage, etc.

KEY WEATHER CONDITIONS TO CONSIDER

- DO NOT APPLY when weather conditions may cause drift to sensitive crops (e.g. gusty wind toward adjacent sensitive areas or crops; ex non-Roundup Ready 2 Xtend[®] Soybeans)
 - Apply when wind is blowing away from sensitive areas or crops
- Avoid applications when the temperature is expected to exceed 30°C
- DO NOT APPLY during a <u>Temperature Inversion</u> as <u>potential for Off</u> <u>Target Movement increases</u>
 - Dead Calm conditions indicate a potential temperature inversion
 - Application during daylight hours is recommended



APPLICATION REQUIREMENTS





SUMMARY OF KEY LABEL APPLICATION REQUIREMENTS

- Use nozzle and spray pressure combinations that produce Extremely Coarse to Ultra Coarse Droplets and minimize driftable fines
- Spray early before weeds get large (<10cm)
- Keep boom height ≤ 50 cm from target crop or weed canopy
- Apply when wind speeds are between 5-15 km/h and when wind is blowing away from sensitive areas or crops
- Do not exceed a ground speed of 25 km/h
- Use a minimum of 100 L/ha (10 GPA) of spray solution per acre for optimal performance
 - It is recommended to Increase application volume to 150 L/ha (15 GPA) when targeting large weeds or using a Drift Reduction Additive (DRA)
- Do not apply during a **Temperature Inversion** as **potential for Off Target Movement increases**
 - Application during daylight hours is recommended
- Do not mix with Ammonium Sulfate and other ammonium-based additives
- Use triple rinse clean-out procedure



KEY RECOMMENDATIONS FOR SUCCESS WITH THE ROUNDUP READY® XTEND CROP SYSTEM







- Apply the <u>high</u> label rate of XtendiMax[®] herbicide with VaporGrip[®] Technology along with Roundup WeatherMAX[®] herbicide <u>or</u> Roundup Xtend[®] herbicide with VaporGrip[®] Technology as part of the **first herbicide application** in the field
- Use Ultra Coarse (UC) spray quality and follow the application requirements: it is important to maintain proper operating pressure to maintain adequate pattern and droplet size
- Include an additional effective site of action when targeting glyphosate-resistant weeds for effective weed control and proper herbicide stewardship.



THANK YOU! **GenuityTraits.ca ROUNDUP READY®** ©2019 Bayer Group Company Confidential

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ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS. Performance may vary from location to location and from year to year, as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible and should consider the impacts of these conditions on the grower's fields.

Roundup Ready 2 Xtend® soybeans contain genes that confer tolerance to glyphosate and dicamba. Agricultural herbicides containing glyphosate will kill crops that are not tolerant to glyphosate, and those containing dicamba will kill crops that are not tolerant to dicamba. Contact your local crop protection dealer or call the technical support line at 1-800-667-4944 for recommended Roundup Ready® Xtend Crop System weed control programs. Tank mixtures: The applicable labeling for each product must be in the possession of the user at the time of application. Follow applicable use instructions, including application rates, precautions and restrictions of each product used in the tank mixture. Bayer has not tested all tank mix product formulations for compatibility or performance other than specifically listed by brand name. Always predetermine the compatibility of tank mixtures by mixing small proportional quantities in advance. Bayer, Roundup Ready 2 Xtend®, Roundup Ready®, Roundup Transorb®, Roundup WeatherMAX®, Roundup Xtend®, Transorb®, VaporGrip® and XtendiMax® are registered trademarks of Bayer Group, Monsanto Canada ULC licensee. Conquer® is a registered trademark of Nufarm Agriculture Inc. Valtera™ is a trademark of Valent U.S.A. Corporation. All other trademarks are the property of their respective owners. ©2019 Bayer Group. All rights reserved.

