

Glyphosate Resistant Weed Management In American Crystal Growing Area



Agenda

- Before RR Resistant Crops
- RR Resistant Weeds in ACSC
- Corn, Soybeans, Canola & Beets are Weeds
- What You Can Do
- Summary



Resistance Before Roundup & American Crystal Sugar Company SU Resistant Kochia



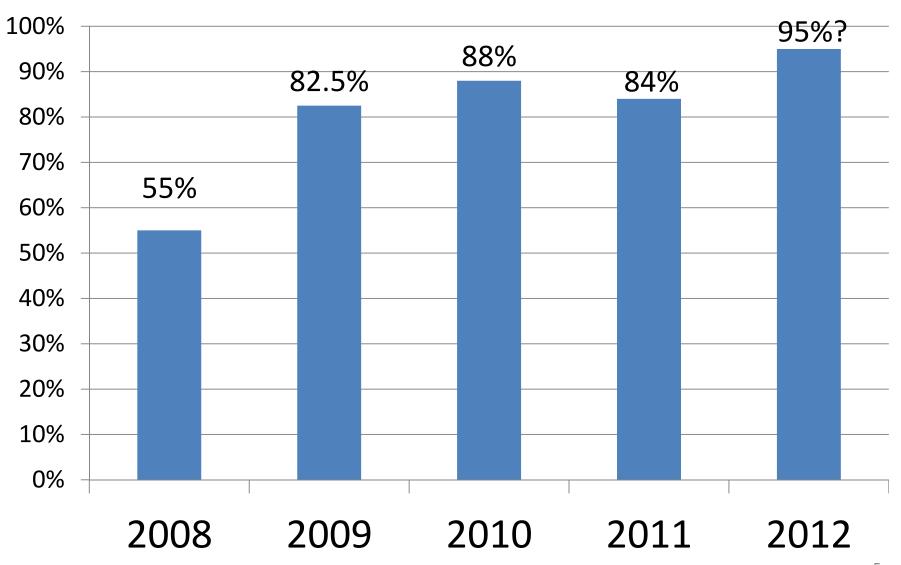


Conventional Herbicides

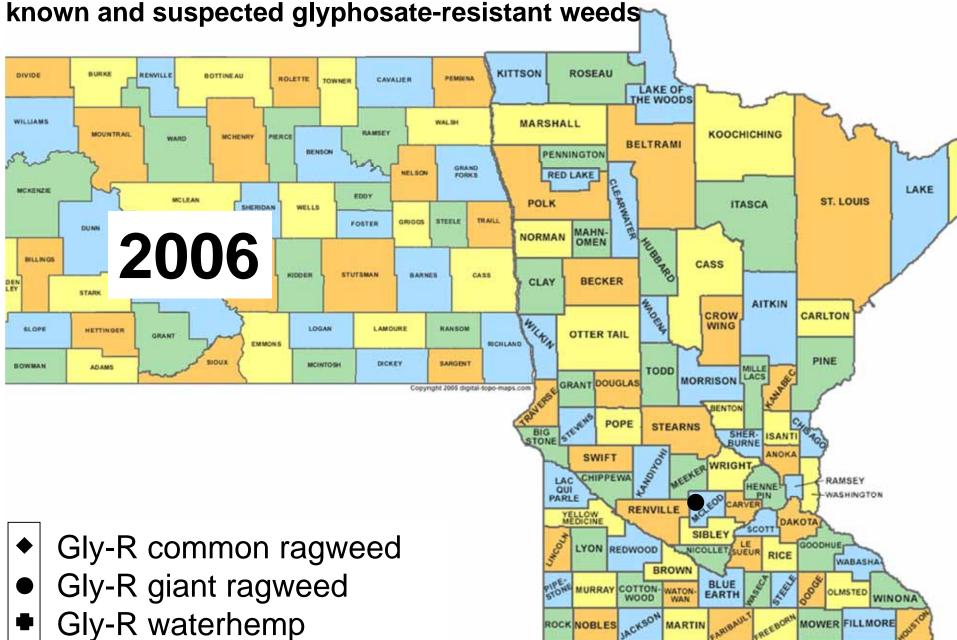
- Many times less than adequate control
- Timing an issue extended rain events
- Labor intensive
 - Multiple sprays 3-5 times
 - Multiple Cultivations and Mechanical Control

Percent Of Roundup Ready Sugarbeets In ACSC





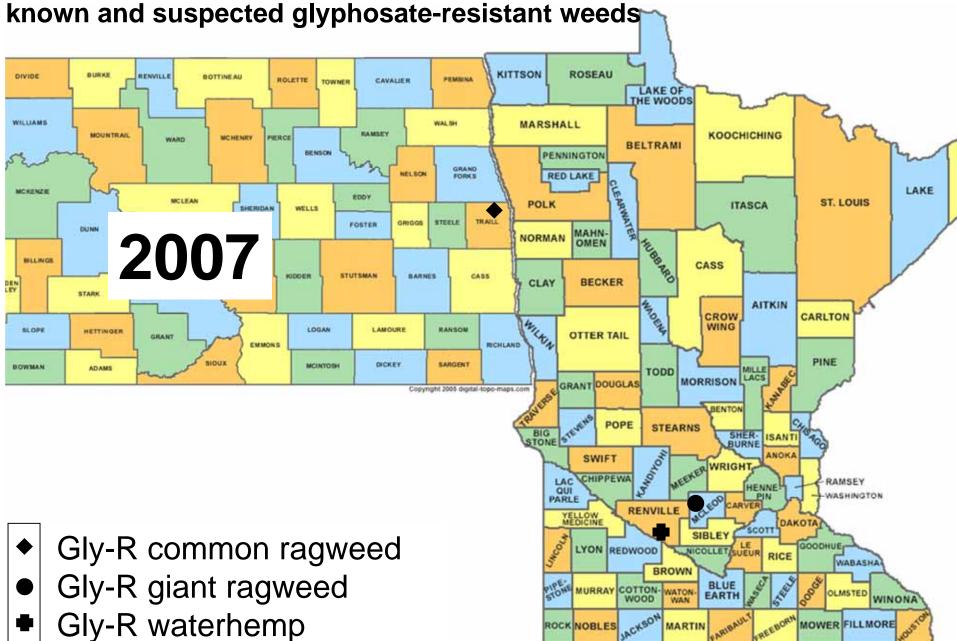
Areas and counties of ND and MN having





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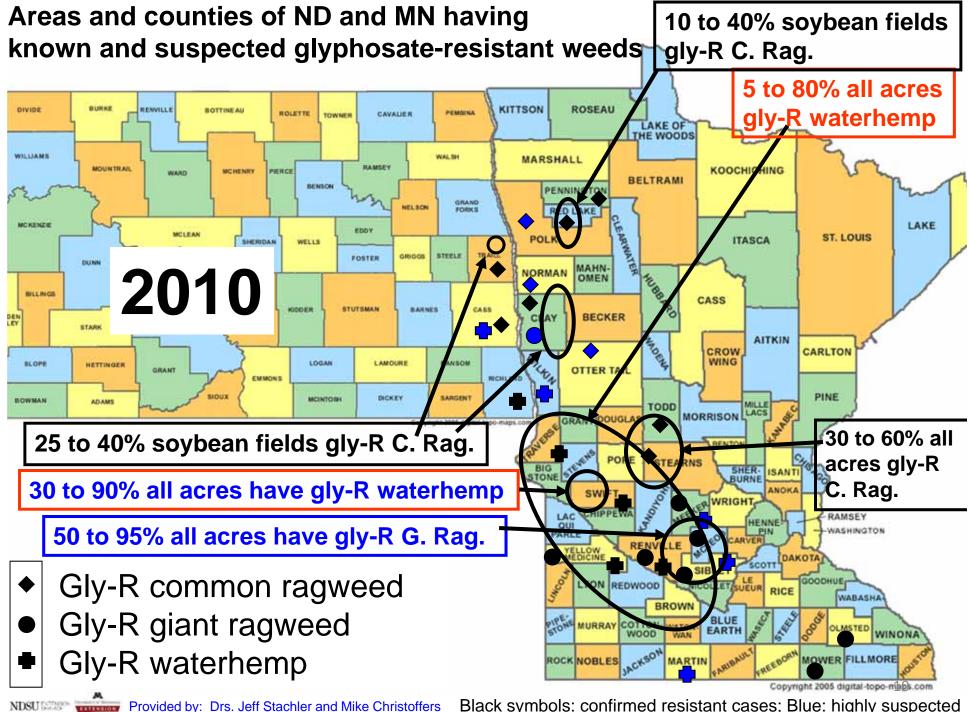
Areas and counties of ND and MN having known and suspected glyphosate-resistant weeds 5 to 20% all acres KITTSON ROSEAU RENVILLE gly-R waterhemp DIVIDE ROLETTE CAVALIER TOWNER LAKE OF THE WOODS WILLIAMS MARSHALL KOOC MOUNTRAIL MCHENEY PERCE BELTRAMI BENSON PENNINGTON NELSON RED LAKE LAKE MCKENZE EDDY ST. LOUIS ITASCA SHERIDAN WELLS STEELE FOSTER GRIGGS MAHN-OMEN NORMAN 2008 BILLINGS CASS KIDDER BARNES BECKER **AITKIN** CROW CARLTON WING LAMOURE SLOPE HETTINGER OTTER CHANY RICHLAND EMMONS PINE DICKEY MCINTOSH MORRISON LACS 15 to 40% all < 5% soybean fields gly-R C. Rag. acres gly-R C. Rag. 40 to 75% all acres have gly-R G. Rag. & CHIPPEWA 20 to 40% all acres have gly-R waterhemp SCOTT Gly-R common ragweed LYON REDWOOD WABASHA Gly-R giant ragweed BLUE MURRAY COTTON WATON WAN WINONA Gly-R waterhemp MOWER FILLMORE MARTIN



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Areas and counties of ND and MN having 10 to 30% soybean fields known and suspected glyphosate-resistant weeds gly-R C. Rag. 5 to 20% all acres KITTSON ROSEAU gly-R waterhemp RENVILLE DIVIDE CAVALIER TOWNER LAKE OF THE WOODS WILLIAMS MARSHALL KOOCHI MOUNTRAIL MCHENEY PERCE BELTRAMI BENSON NELSON LAKE MCKENZE EDDY ST. LOUIS ITASCA SHERIDAN WELLS STEELE FOSTER GRIGGS MAHN-OMEN NORMAN 2009 BILLINGS CASS KIDDER BARNES BECKER **AITKIN** CROW CARLTON WING LAMOURE SLOPE HETTINGER OTTER T CHANY EMMONS PINE DICKEY MCINTOSH MORRISON LACS 30 to 60% all 25 to 40% soybean fields gly-R C. Rag. acres gly-R C. Rag. 30 to 95% all acres have gly-R G. Rag. Gly-R common ragweed ON REDWOOD WABASHA Gly-R giant ragweed BLUE WINONA Gly-R waterhemp MOWER FILLMORE NDSU Provided by: Drs. Jeff Stachler and Mike Christoffers







Areas and counties of ND and MN having known and suspected glyphosate-resistant weeds 5 to 95% all acres gly-R waterhemp RENVILLE KITTSON ROSEAU DIVIDE BOTTINEAU PEMBINA HOLETTE TOWNER CAVALIER LAKE OF THE WOODS WILLIAMS WALSH HAMSEY MOUNTRAIL KOOCHI WARD BELTRAMI NELSON RED LAKE MCKENZIE LAKE EDDY ITASCA SHERIDAN WELLS GRIGGS 70 to 95% all FOSTER **2011** acres gly-R BILLINGS CASS KIDDER C. Rag. AITKIN CROW 30 to 60% all WING LOGAN SLOPE EMMONS acres gly-R C. Rag. MORRISON 5 to 50% soybean fields gly-R C. Rag. 5 to 95% all 70 to 95% all acres have gly-R waterhemp acres gly-R G. Rag. & 60 to 95% all acres have gly-R G. Rag. waterhemp Gly-R horseweed Gly-R kochia LYON REDWOOD Gly-R common ragweed WINONA Gly-R giant ragweed Gly-R waterhemp Black symbols: confirmed resistant cases; Blue: highly suspected NDSU Provided by: Drs. Jeff Stachler and Mike Christoffers

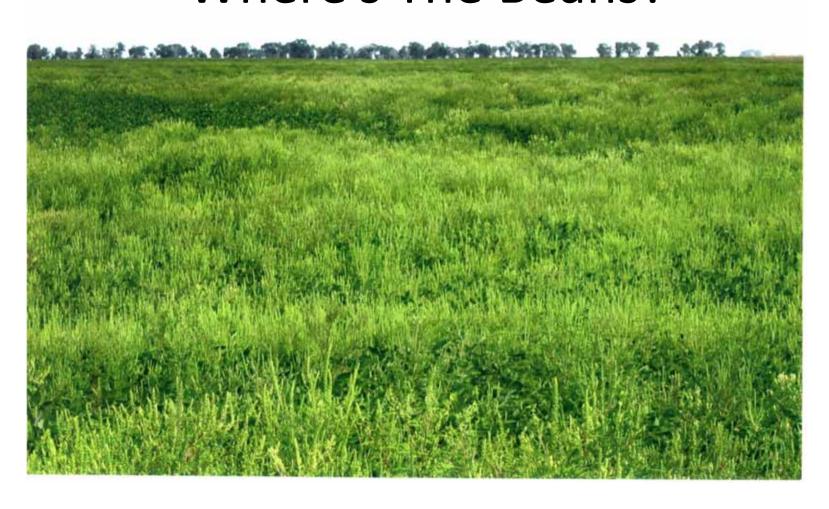


Glyphosate Resistant Weeds In MN & ND Sugarbeet Producing Counties.

- Common Ragweed
- Waterhemp
- Giant Ragweed
- Horseweed
- Suspect Common Lambsquarters



Glyphosate Resistant Ragweed Where's The Beans?



Glyphosate Resistant Ragweed



2 Different Farmers With2 Different Management Styles



Glyphosate Resistant Ragweed American Crystal Sugar Company





Glyphosate Resistant Ragweed American Crystal Sugar Company





Glyphosate Resistant Waterhemp Sugar Company





Glyphosate Resistant Horsetail American Crystal Sugar Company





Suspected Glyphosate Resistance Or High Tolerance



- CommonLambsquarters
- Wild Buckwheat
- Dandelion
- Common Mallow
- Horsetail
- Smartweed

- Clover
- Cinquefoil
- Kochia
- Nightshade
- Nutsedge
- Prickly Lettuce
- Waterhemp

Dandelion





Wild Buckwheat & Dandelion









- Corn Use Assure II or Select
- Soybeans Use Stinger
- Canola Use UpBeet

The use of these herbicides in beet fields will also help in controlling Glyphosate resistant weeds

RR Canola & RR Corn





Annual RR Beets As Weeds In Other Crops









Strategies to Combat Resistant Weeds

- Scout fields to identify escapes
- Herbicide tank mixes with multiple MOA
- Rotate different MOA in consecutive years
- Rotate crops to enable different MOA
- Use labor and mechanical weed control
- Prevent seed production



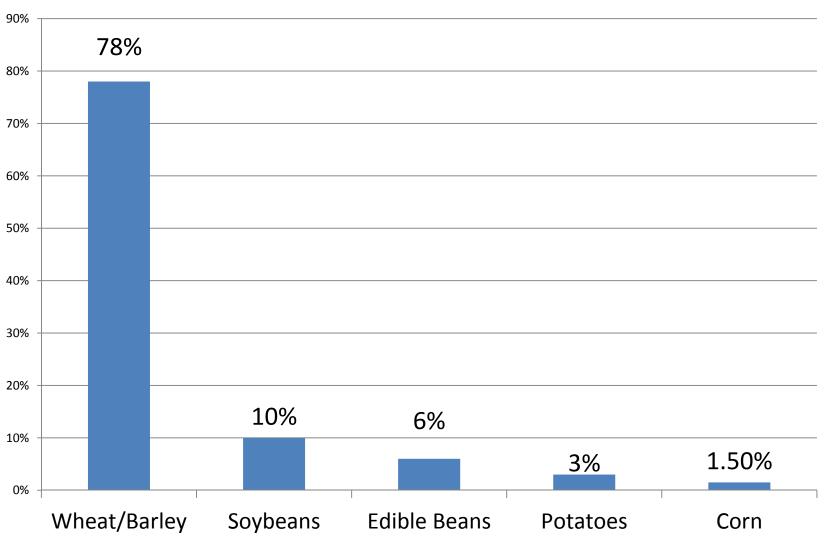
What Can You Do?

- Keep small grains in you crop rotation
- Use Pre-Emerge Herbicides in rotational crops (corn and soybeans)
- Tank-mix other Herbicides with Glyphosate
- Use Liberty Link Technology in corn & soybeans

Small Grains in the Rotation



ACSC 2011 Top 5 Preceding Crops



Sugarbeet 1st Two Roundup Applications Up To 8-Leaf Stage

Roundup PowerMax[®]

1st Two Sprays:

Use 28 oz/A (0.98 lbs./A Acid Equivalent)

-OR-

1st Spray: Use 32 oz./A (1.125 lbs./A AE)

2nd Spray: Use 24 oz./A (0.84 lbs./A AE)

- Tank-mix 3 oz./A of Stinger
 - Do not mix if using Quadris in Roundup tank-mix
- Refer to Roundup® label to maximize control



On The Following Slides Herbicides Were Selected Based On:

- No Pursuit or Atrazine Present
- Labeled in Both ND and MN
- Short Rotation Restriction to Sugarbeets
- Effectiveness
- Spur Discussion with your Local Ag Suppliers



Pre-Emerge In Corn & Soybeans

Corn Pre-Emerge:

Pre-Emerge Herbicides	Sugarbeet Rotation	Common	Giant			
for RR Corn	Restrictions	Ragweed	Ragweed	Lambsquarters	Kochia	Waterhemp
Verdict @ > 10 fl oz/A	NCS	G/E	G	G/E	G/E	G/E
Harness / Surpass	NCS	F	Р	F/G	F	G/E
Callisto	18 mth	G/E	G	G/E	Р	G/E

Soybean Pre-Emerge:

Pre-Emerge Herbicides	Sugarbeet Rotation	Common	Giant			
for RR Soybeans	Restrictions	Ragweed	Ragweed	Lambsquarters	Kochia	Waterhemp
Valor	NCS	N/F	N/P	G/E	G/E	G/E
Verdict @ 5 fl oz/A	NCS	P/F	Р	P/G	P/F	F/G
Boundary (Sencor+Dual)	18 mth	G	P/F	G	Р	G/E

Tank-mixes In Corn & Soybeans

Corn Post Tank-Mixes:

		Common	Giant			
Post Tank Mixes with Glyphosate for RR Corn		Ragweed	Ragweed	Lambsquarters	Kochia	Waterhemp
Status	4 mth	G/E	G/E	G/E	Е	G
Banvel /Clarity	NCS	G/E	G	G	G/E	G
Impact	18 mth	G	G	G/E	E	G/E
Laudis	18 mth see label	G	G	G/E	E	G/E
Callisto	18mth	F	G	G/E	P/F	E

Soybean Post Tank-Mixes:

Post Tank Mixes with Gly	phosate for RR Soybear	าร				
Flexstar	18 mth	G/E	G	P/F	G	G/E
Cobra	NCS	G/E	G	Р	P/F	G/E





More Options In Corn

 As you can see corn herbicides provide the most effective options

Liberty Link Technology

- In soybeans or corn
- Provides new mode of action to cropping system
- Liberty needs ideal hot days and high rates and possible tank mixes for good control



Work With Ag Suppliers

- Work with your local Ag Supplier to help you develop a plan for Roundup Resistance Management in your rotational crops
- Many have been talking with their customers already



Summary

- ACSC is seeing some resistant cases
- ACSC is encouraging growers to adopt resistant breaking strategies
- Growers best option is in controlling resistance in rotational crops
- Continue a large percentage of small grain production
- Corn has the most resistance options
 - Due to more effective & economical herbicides

AGRONOMY GOLD STANDARDS

Tips to Keep Roundup® Ready Technology Working In Your Sugarbeet Fields





Above photos show Roundup Ready Resistant Common Ragweed in sugarbeets and soybeans.

Strategies to Combat Resistant Weeds

- Scout fields to identify escapes.
- · Tank mix herbicides with multiple MOA (Modes Of Action).
- Rotate different MOA in consecutive years.
- Rotate crops to enable different MOA.
- · Use labor and mechanical weed control.
- Prevent weed seed production.

What You Can Do

- Keep small grains in your rotation.
- Use Pre-Emerge Herbicides in Rotational Crops (corn & soybeans).
- Tank-mix other herbicides with Glyphosate/Roundup®.
- · Use Liberty Link corn and/or soybean varieties.

1st Two RR Beet Sprays Up To 8-leaf Stage

Use 28 oz./A Roundup PowerMax® Rate (0.98 lbs./acre Acid Equivalent).

Use 32 oz./A 1st spray and 24 oz./A 2nd spray Roundup PowerMax*. (1.125 lbs./acre and 0.84 lbs./acre Acid Equivalents).

- Tank-mix 3 oz./Acre of Stinger.
- Refer to Roundup® label for ways to maximize control.





Pre-Emerge & Post Herbicide Options in RR Corn

Pre-Emerge Herbicides for RR Com	Sugarbeet Rotation Restrictions	Common Ragweed	Giant Ragweed	Lambsquarters	Kochia	Waterhemp
Verdict@>10fl oz/A	NCS	G/E	G	G/E	G/E	G/E
Harness / Surpass	NCS	F	P	F/G	F	G/E
Callisto	18 mth	G/E	G	G/E	Р	G/E
Post Tank Mixes with Gly	phosate for RR Corn					
Post Tank Mixes with Gly Status	phosate for RR Corn 4 mth	G/E	G/E	G/E	F	G
Status		G/E G/E	G/E G	G/E G	_	G
Status Banvel /Clarity	4 mth	G/E G/E			E G/E E	
Status Banvel /Clarity Impact	4 mth NCS	G/E	G	G	_	G
	4 mth NCS 18 mth	G/E G	G G	G G/E	_	G G/E

Pre-Emerge & Post Herbicide Options in RR Soybeans

Sugarbeet Rotation Restrictions	Common Ragweed	Giant Ragweed	Lambsquarters	Kochia	Waterhemp
NCS	N/F	N/P	G/E	G/E	G/E
NCS	P/F	P	P/G	P/F	F/G
18 mth	G	P/F	G	Р	G/E
phosate for RR Soybea	ns				
18 mth	G/E	G	P/F	G	G/E
	Restrictions NCS NCS 18 mth	Restrictions Ragweed NCS N/F NCS P/F 18 mth G	Restrictions Ragweed Ragweed NCS N/F N/P NCS P/F P 18 mth G P/F phosate for RR Soybeans	Restrictions Ragweed Ragweed Lambsquarters NCS N/F N/P G/E NCS P/F P P/G 18 mth G P/F G phosate for RR Soybeans	Restrictions Ragweed Ragweed Lambsquarters Kochia NCS N/F N/P G/E G/E NCS P/F P P/G P/F 18 mth G P/F G P phosate for RR Soybeans P P P P

NCS = Next Cropping Season 2CS = Two Cropping Seasons N = None P = Poor F = Fair G = Good E = Excellent

As shown, there are more effective options in Corn.

Liberty Link® Corn and Soybeans Varieties are Options also.







Main Message:

Keep Glyphosate Working In Sugarbeets!



Your
Comments
&
Questions