

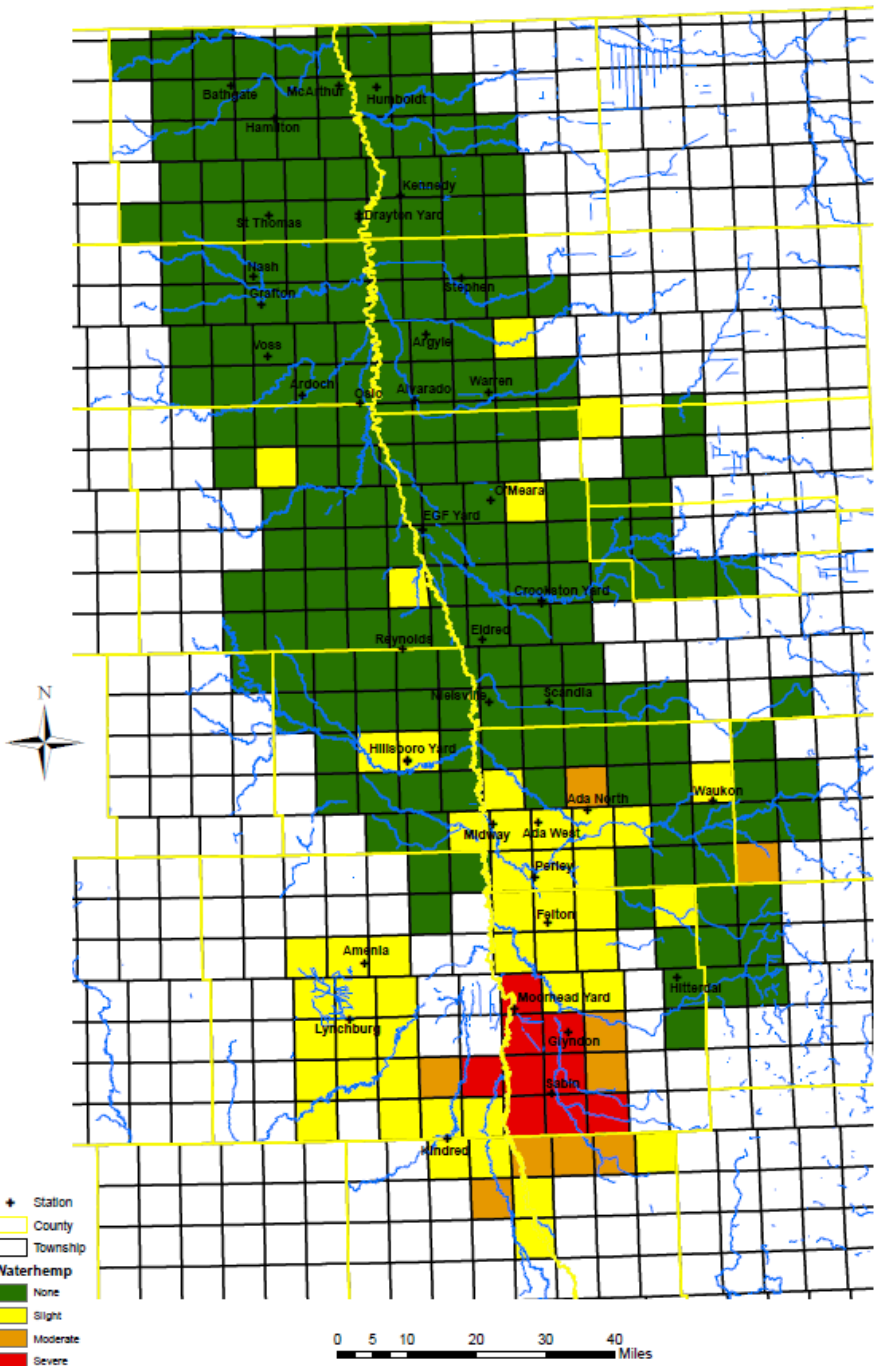


Weed Resistance YWTG 2017

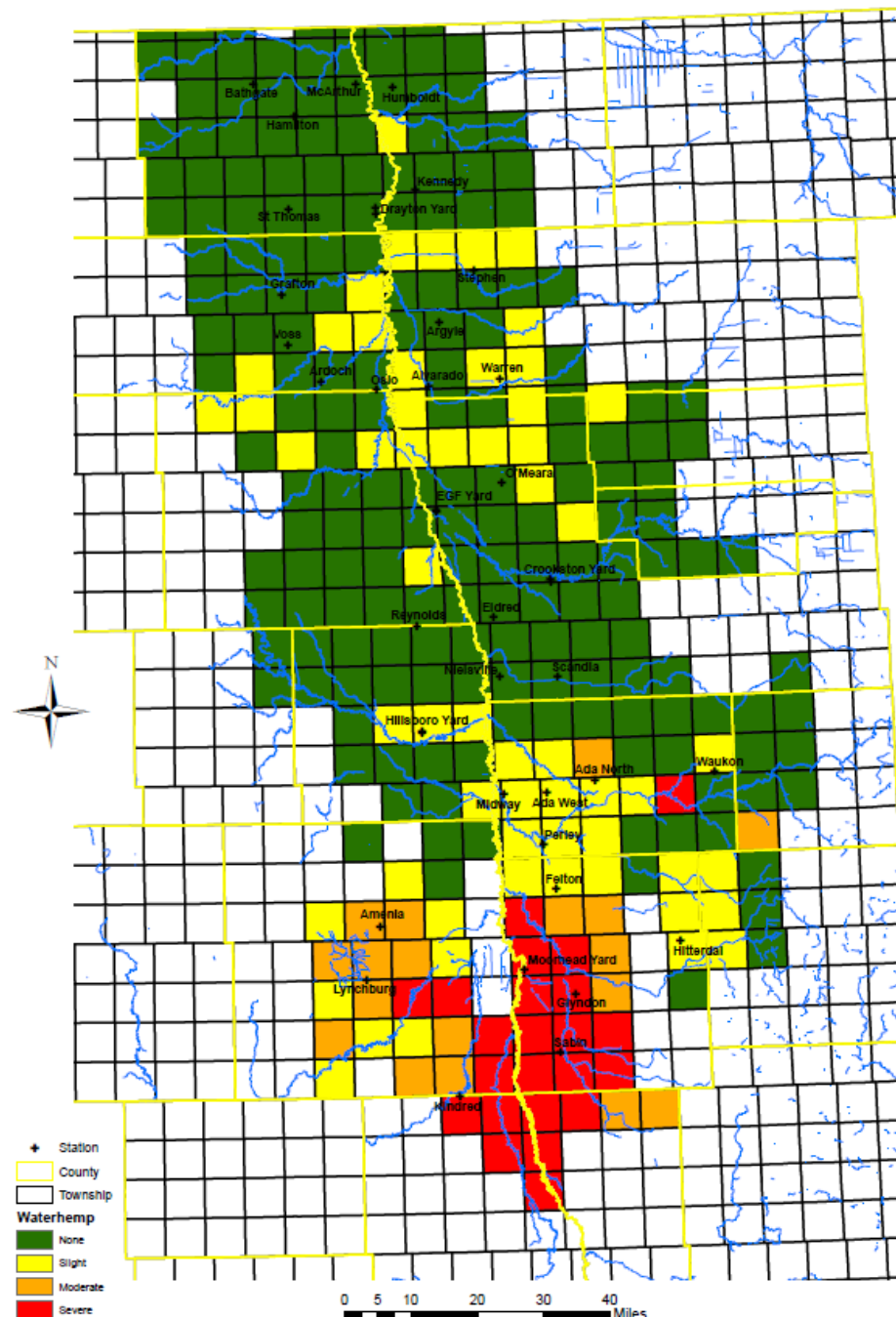
Agenda

- Monitoring Resistance Weed Trends
- Weed Identification
- Keys to Resistant Weed Control
- Chemical Distribution
- Conventional Herbicide Update

2015 Weed Resistance Map - Waterhemp



2016 Weed Resistance Map - Waterhemp



Pigweed

Waterhemp

Pigweed Seedling Stage

- Cotyledons "Elongated"
- 1st Leaves rounded like "C" shape
- Fine hairs throughout plant
- Rough stem & leaf surfaces

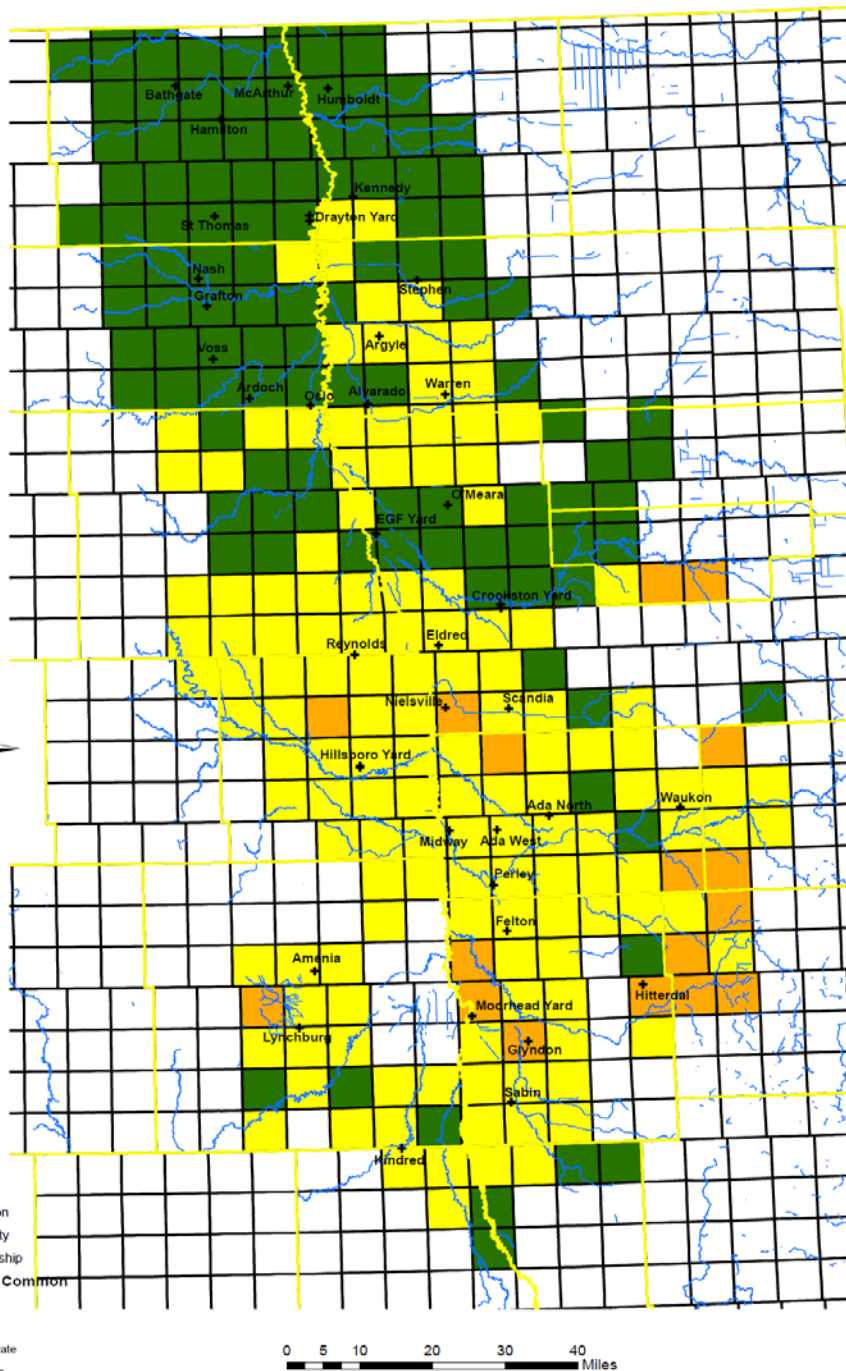
Waterhemp Seedling Stage

- Cotyledons "Egg-Shaped"
- Actual leaves are waxy long & narrow
- No hairs on plant "hairless"
- Smooth stem & leaf surfaces

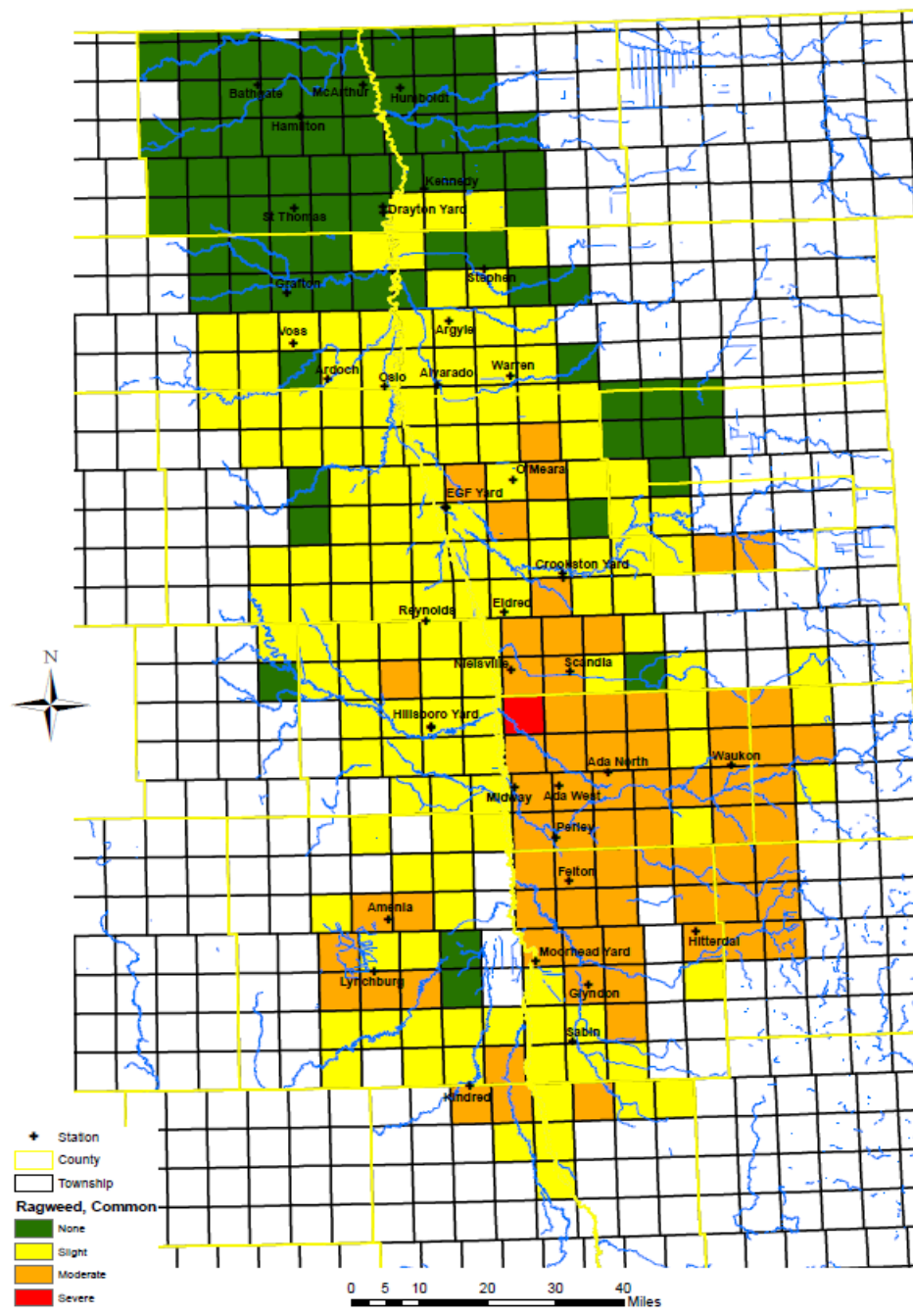
Steps to Successful Waterhemp Control

- Pre-emerge Herbicide Application
 - Dual Magnum, Nortron
- Tank Mix of Post-emerge Herbicides
 - Glyphosate, Nortron, Betamix, Upbeet
 - Proper ID of Waterhemp
 - Spray when weeds are 2” or less
- Split-layby Herbicide Application
 - Outlook, Dual Magnum, Warrant

2015 Weed Resistance Map - Ragweed, Common



2016 Weed Resistance Map - Ragweed, Common





**Biennial
Wormwood**

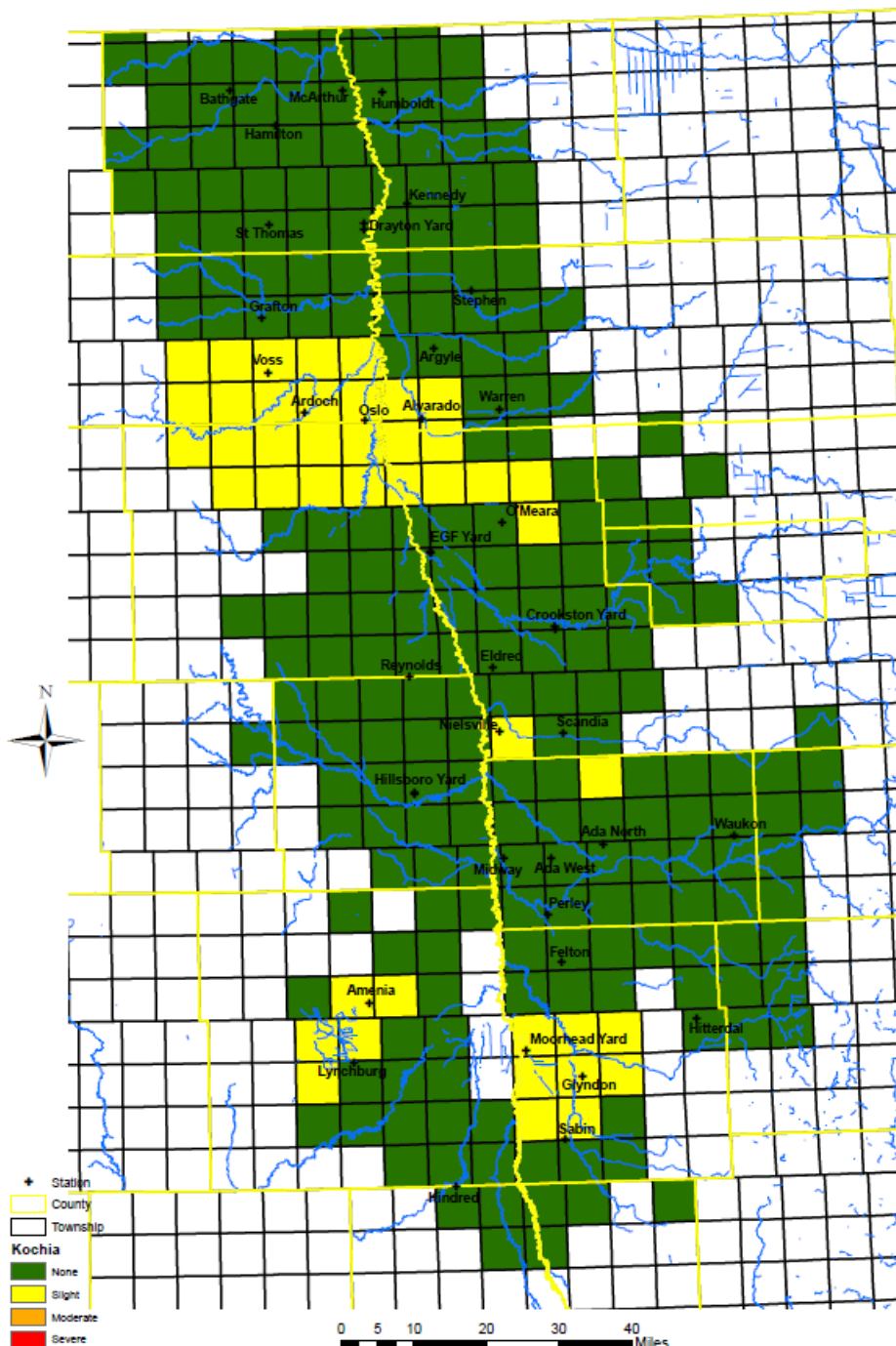


**Common
Ragweed**

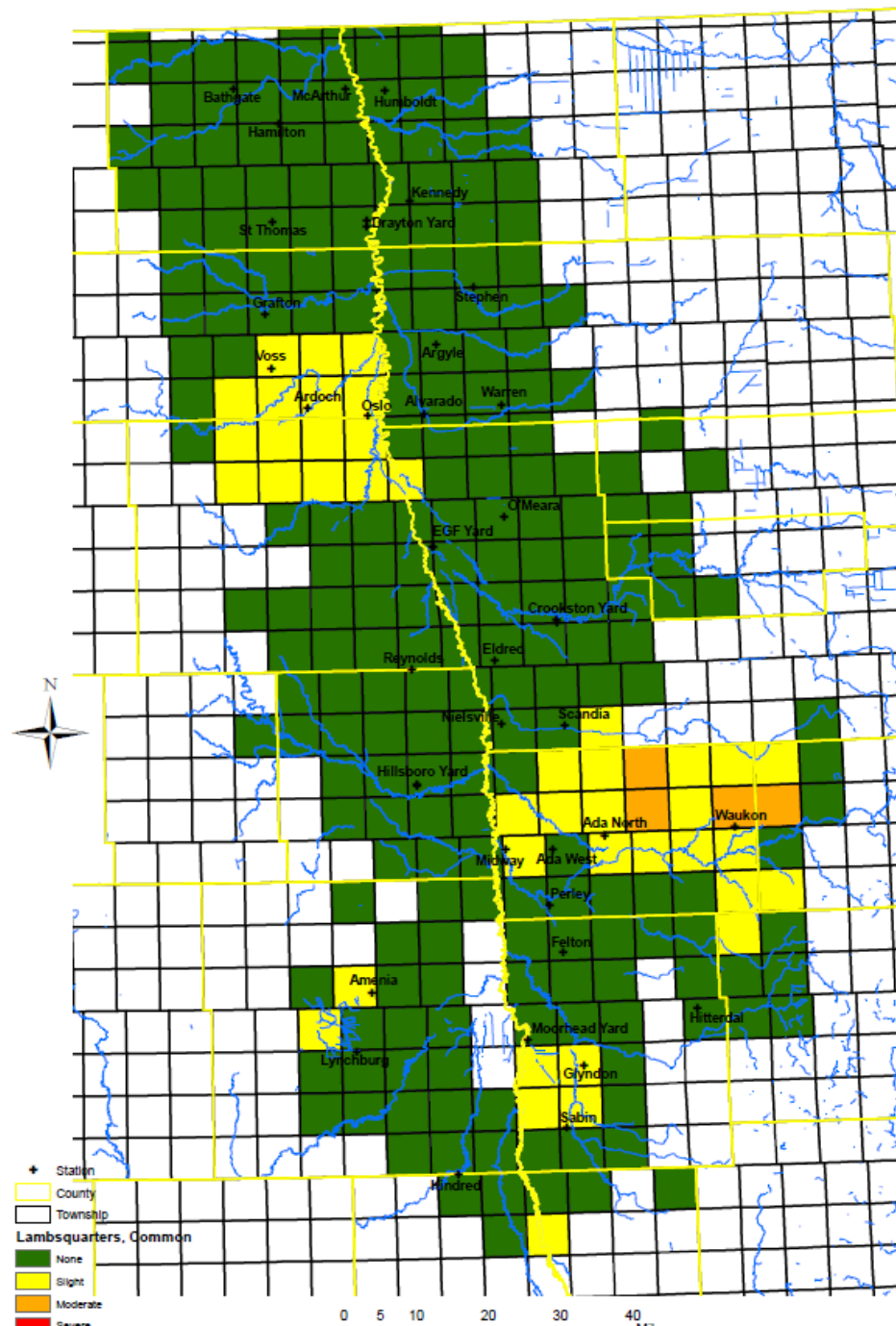
Steps to Successful Common Ragweed Control

- Tank Mix of Post-emerge Herbicides
 - Glyphosate + Stinger
 - Spray weeds 2” or less for best results
 - Multiple Stinger applications is a must!
 - Stinger is labeled up to 8 leaf

2016 Weed Resistance Map - Kochia



2016 Weed Control Map - Lambsquarters



Kochia/Common Lambsquarter

- Kochia
 - Keep an eye out for this weed
- Common Lambsquarters
 - No known resistance
 - If control seems marginal, hit it again in 10 days



Resistant Weed Quick Guides

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

Strategies to Combat Resistant Weeds

- Tank mix herbicides with multiple MOA (Modes Of Action). Rotate different MOA in consecutive years.
- Prevent weed seed production **in all locations including field, ditches, shelterbelts and old yards.**
- Scout fields to identify escapes.
- Rotate crops to enable different MOA.
- Use labor and mechanical weed control.

• 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./acre Roundup PowerMax Rate (0.98 lbs./acre Acid Equivalent).
-OR- Use 32 oz./acre 1st spray and 24 oz./acre 2nd spray Roundup PowerMax (1.125 lbs and 0.84 lbs./acre Acid Equivalents).
- Tank-mix 3 oz./acre of Stinger.
- Refer to Roundup label for ways to maximize control.
- If resistant weed populations are present, consult your agronomist for more aggressive strategies including:
 - PPI or Pre Norton and Post Roundup tank mixes with Betamix, Norton and a HSMOC adjuvant.



Pre-Emerge & Post Herbicide Options in RR Corn

Tank Mixes to Apply with Glyphosate to Control Glyphosate Resistant Weeds

Pre-Emergence Herbicides for RR Corn	Site of Action	Formulation	Sugarbeet Rotation Restrictions	Common Ragweed	Redroot Pigweed	Lambsquarters	Kochia	Waterhemp
Verdict	14,15	EC	NCS (4-9 mth)	G/E	G	E	E	E
Sharpen	14	SC	6 mth	G/E	G/E	E	E	G/E
Dicamba	4	SL	NCS	E	F/E	G/E	G/E	F/G
Resicore	4,15,27	SC	18	E	E	E	G	G/E

Post Tank Mixes with Glyphosate for RR Corn

Pre-Emergence Herbicides for RR Soybeans	Site of Action	Formulation	Sugarbeet Rotation Restrictions	Common Ragweed	Redroot Pigweed	Lambsquarters	Kochia	Waterhemp
Status	4,19	WDG	4 mth	E	G/E	G/E	G/E	G/E
Armezon Pro	5,27	SC	18 mth	E	E	E	E	E
Halex GT	9,15,27	SC	18 mth	E	E	E	E	G/E
Impact	27	SC	18 mth	E	E	E	E	G/E
Laudis	27	SC	18 mth see label	E	E	E	E	E
Callisto Xtra	27	SC	18 mth	F	E	E	E	E

Pre-Emerge & Post Herbicide Options in RR Soybeans

Pre-Emergence Herbicides for RR Soybeans	Site of Action	Formulation	Sugarbeet Rotation Restrictions	Common Ragweed	Redroot Pigweed	Lambsquarters	Kochia	Waterhemp
Valor	14	WDG	4-10 mth	P	G/E	F/E	P/G	G
Verdict	14,15	EC	NCS	P/F	G	F/G	P	F/G
Boundary (Sencor+Dual)	5,15	EC	18 mth	P/F	G/E	G	F/G	G/E
Metribuzin	5	DF	18 mth	P/F	G/E	P/G	F/G	F/G
Zidua	15	WDG	15 mth	P	G/E	F/E	F/E	G/E
Fierce (Valor+Zidua)	14,15	WDG	15 mth	P	G/E	F/E	F/E	G/E

Post Tank Mixes with Glyphosate for RR Soybeans

Flexstar	14	EC	18 mth	P/E	G	P/F	G/E	P/E
Cadet	14	EC	NR	N	P	F/G	P/F	P/G
Cobra	14	EC	NCS	P/E	G	N	P/F	P/G

NCS = Next Cropping Season; NR = No Restrictions
N = None P = Poor F = Fair G = Good E = Excellent
EC = Emulsifiable Concentrate; SC = Suspension Concentrate; SL = Soluble Liquid; WDG = Water Dispersible Granule; DF = Dry Flowable

*Liberty Link Corn and Soybeans are options also.

*See 2017 NDSU Weed Control Guide for additional information.

General Pesticide Tank Mixing Order

Read product labels for specific mixing instructions.

To help manage Roundup resistance, it is important to tank mix other pesticides with different modes of action. Use this as a guide to make sure tank mixing of pesticides is done in the correct order based on the product's formulation to avoid any problems in the tank and booms as well as to maintain product efficacy.

Always have water circulating in sprayer tank to ensure continuous agitation. Always give time to every component to dissolve in the water. Adjuvants are added in the same sequence as pesticides, that is, ammonium sulfate is a soluble powder, oil adjuvants are emulsifiable concentrates, and most surfactants are solutions. Within each group, usually add the pesticide before the adjuvant.

1. Fill the tank 50% with water
2. Buffer agent, pH adjusters
3. Water Dispersible Granules (WDG) – Soluble Powder. Continue Agitation and allow plenty of time to dissolve.
4. Wettable Powder (pre-slurry)
5. Suspension Concentrate (SC) – Flowable Concentrate
6. Emulsifiable Concentrate (EC)
7. Crop Oil
8. Soluble Liquid (SL) – Glyphosate
9. Surfactant
10. Top off tank with water
11. Spray as soon as possible



General Sprayer Cleaning Guidelines

Read product labels for specific sprayer cleaning instructions.

When tank mixing pesticides with different modes of action for resistance management, it is critical to effectively clean the sprayer when switching between crops to avoid crop injury.

1. Clean sprayer as soon as possible after use. Dried material is difficult to remove. Residues build up over time and trap additional residues.
2. Drain the tank and all herbicide solution. Rinse down the inside and outside walls of the tank and flush out the booms and nozzles.
3. Fill the tank half full of water (preferably warm) and add tank cleaners recommended on the herbicide label (commercial tank cleaner, detergent or ammonia).
4. Circulate for a few minutes and flush out some of the solution through the boom and nozzles (open boom end caps/valves).
5. Allow the remainder of the solution to stand in the tank for the period of time recommended for the herbicide (overnight is desirable).
6. Pump the remaining solution through the boom and nozzles (open boom end caps/valves).
7. With clean water flush out the tank, lines, boom and nozzles once more (open boom end caps/valves).
8. Remove and clean strainers, nozzle tips and screens and in-line screens.

It may be advantageous to have separate nozzle tips, screens and in-line screens for each crop that the sprayer is being used in.

Resistant Weed Rec's

Glyphosate and Conventional Herbicide Tank-mixes For Weed Resistance Management:



This is not a substitute for reading the product labels

Maximize glyphosate labeled Rates: (4.5 lb a.e. example Roundup Powermax®)	56 oz/A total maximum up to 8-fl stage, 32 oz/A maximum single application 44 oz/A total maximum after 8-fl stage, 22 oz/A maximum single application 96 oz/A total maximum per growing season, emergence through harvest
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- * Minimum of 10 days between glyphosate applications
- * HSMOC adjuvant is required when tank-mixing glyphosate with Conventional herbicides to avoid antagonism
- * Always include AMS at 1 lb/A or liquid equivalent with any glyphosate application **Unless Mixing with Lay-by (oil), Consider using ¼ Rate.
- * The glyphosate rates below are based on using a 4.5 lb acid equivalent/gallon product such as Roundup PowerMAX®.

Early Planted Waterhemp Management

PPiPre:	Norton = 1-3 pt/A & Dual = 0.5 pt/A	OR	Norton = 6-7.5 pt/a	OR	Dual = 0.5 pt/A
*Dual - Syngenta requires farmers to sign indemnified label for PPiPre application					
1st Application on 2-Leaf Sugarbeets:					
Glyphosate = 28 - 32 fl oz/A	Norton = 4 fl oz/A	Outlook = 12 fl oz/A, OR Dual = 1 pt/A, or Warrant = 3 pt/A			
2nd Application 10-14 DAT:					
Glyphosate = 24 - 28 fl oz/A	Norton = 4 oz/A	Outlook = 12 fl oz/A, OR Dual = 1 pt/A, or Warrant = 3 pt/A			
3rd Application 10-14 DAT:					
Glyphosate = 22 fl oz/A	Norton = 4 fl oz/A				
Rescue:	Betamix = 12 - 22 fl oz/A OR Progress = 9 - 16 fl oz/A	UpBeet = .75 - 1 oz/A	Norton = 4 fl oz/A		
*Use following Adjuvants for conventional herbicide tank-mix		HSMOC = 1 pt/A	AMS = 1 lb/A		

Late Planted Waterhemp Management

1st Application on 2-Leaf Sugarbeets:					
Glyphosate = 28 - 32 fl oz/A	Betamix = 12 fl oz/A OR Progress = 9 fl oz/A	Norton = 4 fl oz/A	Outlook = 12 fl oz/A, OR Dual = 1 pt/A, or Warrant = 3 pt/A		
2nd Application 10-14 DAT:					
Glyphosate = 24 - 28 fl oz/A	Betamix = 16 fl oz/A OR Progress = 12 fl oz/A	Outlook = 12 fl oz/A, OR Dual = 1 pt/A, or Warrant = 3 pt/A			
3rd Application 10-14 DAT:					
Glyphosate = 22 fl oz/A	Betamix = 22 fl oz/A OR Progress = 16 fl oz/A				
Rescue:	Betamix = 12 - 22 fl oz/A OR Progress = 9 - 16 fl oz/A	UpBeet = .75 - 1 oz/A	Norton = 4 fl oz/A		
*Use following Adjuvants for conventional herbicide tank-mix		HSMOC = 1 pt/A	AMS = 1 lb/A		

Resistant Kochia Management

6-7.5 pt/A		
on Kochia & 4 if Sugarbeet:		
Betamix = 12 fl oz/A OR Progress = 9 fl oz/A	Norton = 4 fl oz/A	
Betamix = 16 fl oz/A OR Progress = 12 fl oz/A	Norton = 4 fl oz/A	
Betamix = 22 fl oz/A OR Progress = 16 fl oz/A	Norton = 4 fl oz/A	
Betamix = 2-3 pts/a OR Progress = 1.5-2.2 pts/a		
Conventional herbicide tank-mix	HSMOC = 1 pt/A	AMS = 1 lb/A

Resistant Ragweed Management

1st Application on Cotyledon Sugarbeets:	Glyphosate = 28 - 32 fl oz/A	Stinger = 2 - 3 fl oz/A
2nd Application 10-14 DAT:	Glyphosate = 24 - 28 fl oz/A	Stinger = 3 - 4 fl oz/A
3rd Application 10-14 DAT:	Glyphosate = 22 fl oz/A	Stinger = 3 - 4 fl oz/A
4th Application 10-14 DAT (if needed):	Glyphosate = 22 fl oz/A	Stinger = 3 - 4 fl oz/A
*Use following Adjuvants for conventional herbicide tank-mix		NIS = 0.25%v/v
		AMS = 1 lb/A

Product Notes:

- *Stinger: Labeled on cotyledon to 8-fl sugarbeets; total maximum per season = 10.7 fl oz/A; 45 day PHI
- *Norton: total maximum in season = 12oz/A; 90 day PHI
- *Betamix & Progress = 75 day PHI
- *Glyphosate = 30 day PHI (see top page for in season totals)
- *Upbeet: total maximum per season = 2.5 oz/A; 60 day PHI
- *Outlook: total maximum in season = 24oz/A; <21 fl oz/A in single app. See plantback; 60 day PHI
- *Dual & Generics (S- metolachlor) (see top page for pre note); max season post <2.6 pts/A; 60 day PHI
- *Warrant = 70 day PHI

Generic Betamix products are:	Sugarbeet Mix	&	Phen-Des 8-6
Generic Progress Product is:	BnB Plus		

Note on Post Quadris Application: Quadris **SHOULD NOT** be tank-mixed with the Conventional Herbicides (includes Lay-bys) or applied right before or after a Conventional application as sugarbeet injury will occur. Optimal timing is 3 days before or 3 days after application.

Tank-mixing Order for Glyphosate and Conventional Herbicides

1. Fill spray tank 1/2 full with clean water (warmed water is best)
2. If used - slurry UpBeet, Warrant in warm water (WDG's)
3. Add AMS liquid or dry (water conditioner)
4. If used - Add Slurred WDG to tank
5. If used - Add Norton (SC)
6. Fill 2/3 full of water
7. Add Betamix, Progress, or Betanex, Outlook, Dual (EC)
8. If used - Add Stinger (SL)
9. Add glyphosate
10. Add additives (NIS, COC, MSO, HSMOC and drift/deposition agents)
11. Finish filling spray tank - continue agitation
12. Spray tank empty as soon as possible

Chemical Distribution



- It will happen in 2017
- You will be updated on details soon
- 156 pallets of chemical in inventory

Conventional Herbicide Update

- Ethofumesate (Nortron, Ethotron, Etho SC)
 - Need label edited for >12 oz/acre Broadcast POST
 - Need label edited for < 90 day PHI
 - Summer 2018 or Section 18 prior
- Desmedipham = Betanex “Black Can”
- Phenmedipham (Spin-Aid) + Desmedipham = Betamix “Red Can”
 - Phenmedipham – possible label
 - Desmedipham – challenging, buried deeper

Sugarbeet Research and Extension Report and ND Weed Control Guide

	Betanex *	Betamix	Stinger	UpBeet	Etho- fumesate , 12	Etho- fumesate , 32-64
Lambsquarters	G	G	N	P	N	E
Common Ragweed	P-F	F	G-E	F	N	
Kochia	G-E	F-G	N	F-E	N	G
Redroot Pigweed	F	G	N	F	N-P	G-E
Waterhemp	N	F	N	F	N	F

*Scale: E = 90 to 99%; G = 80 to 90%; F = 65 to 80%; P = 40 to 65%; N = None,
Courtesy Dr. Tom Peters

Any Questions?

