

Weed Control in Sugarbeet Wahpeton

Tom Peters

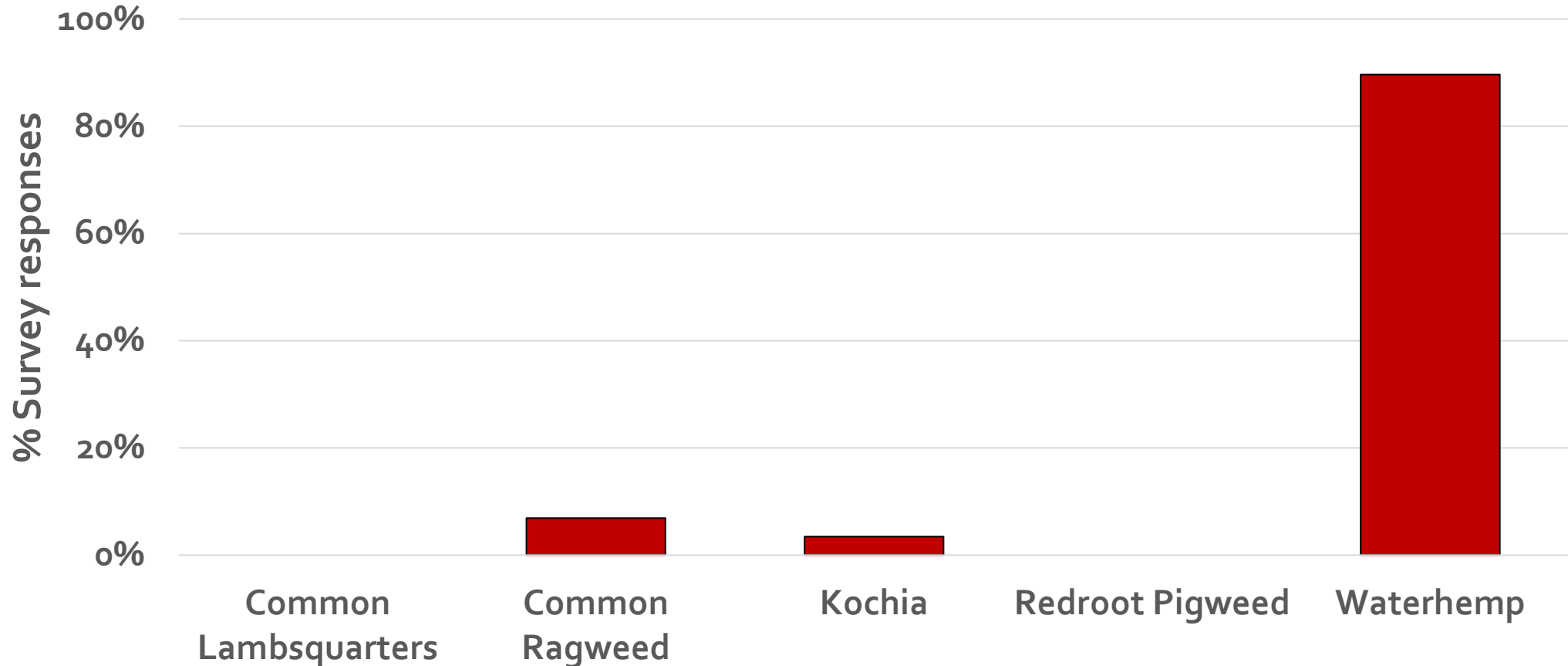
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NDSU

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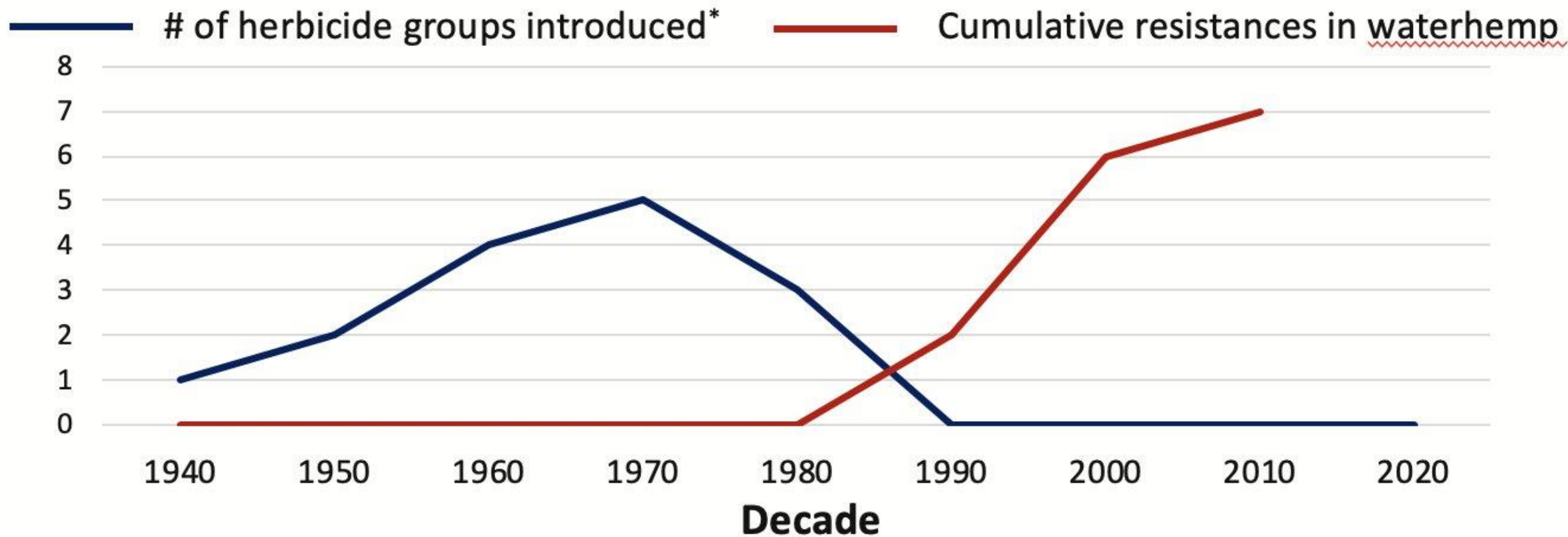
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What was your worst weed problem in 2019?^a



^aTurning Point Survey of Growers; conducted at the 2019 Sugarbeet Growers Seminar, Wahpeton;
survey results at www.sbreb.org

Chemical era of weed management: Nice while it lasted



Resistant weeds in ND/MN*

| Herbicide Group | Weed |
|--------------------|---|
| Group 1 | Wild oat, Green foxtail |
| Group 2 | Kochia , Green foxtail, Common ragweed , redroot pigweed, Waterhemp , Wild oat |
| Group 3 | Green foxtail |
| Group 4 | Kochia |
| Group 5 (atrazine) | Kochia |
| Group 9 | Kochia , Horseweed, Common ragweed , Waterhemp |
| Group 14 | Common ragweed and Waterhemp (suspected) |

*Not a complete list

Why is waterhemp so difficult to manage?

Waterhemp is well-suited for modern agriculture

- Difficulty in weed identification
- Extended germination timing
- Rapid growth
- Well adapted for conserve tillage
- Has benefited from transition to POST herbicides
- Great seed production
- Seed longevity
- Genetic diversity and resistance



Waterhemp cotyledons are wider and shorter (row boats) than redroot pigweed (canoes)



Waterhemp, credit, M. Horak, Kansas State Univ.

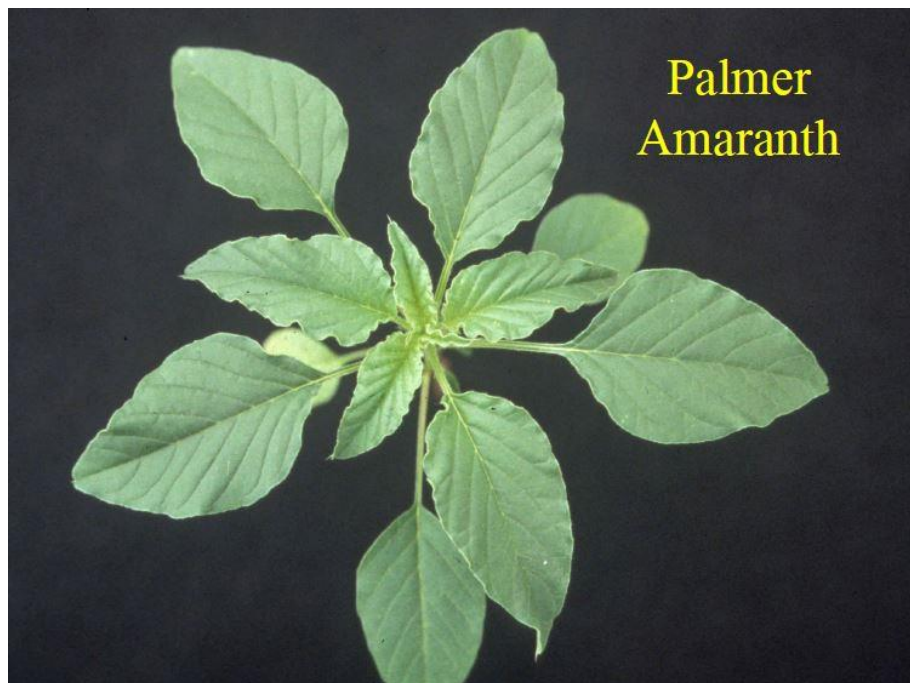
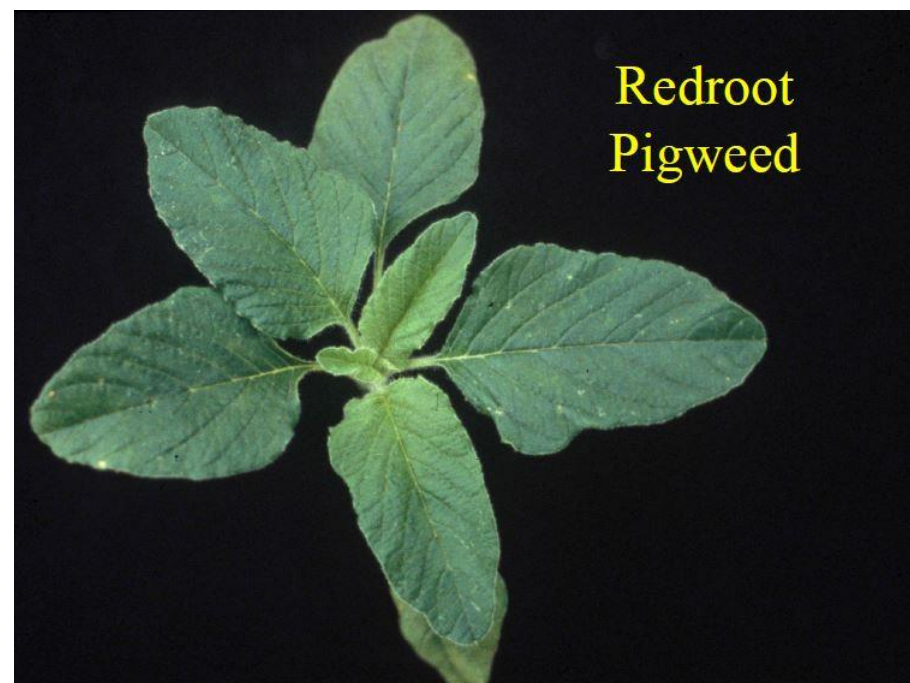
Redroot pigweed, credit, Bruce Ackley, The Ohio State Univ., Bugwood.org



Waterhemp



Waterhemp





Powell amaranth

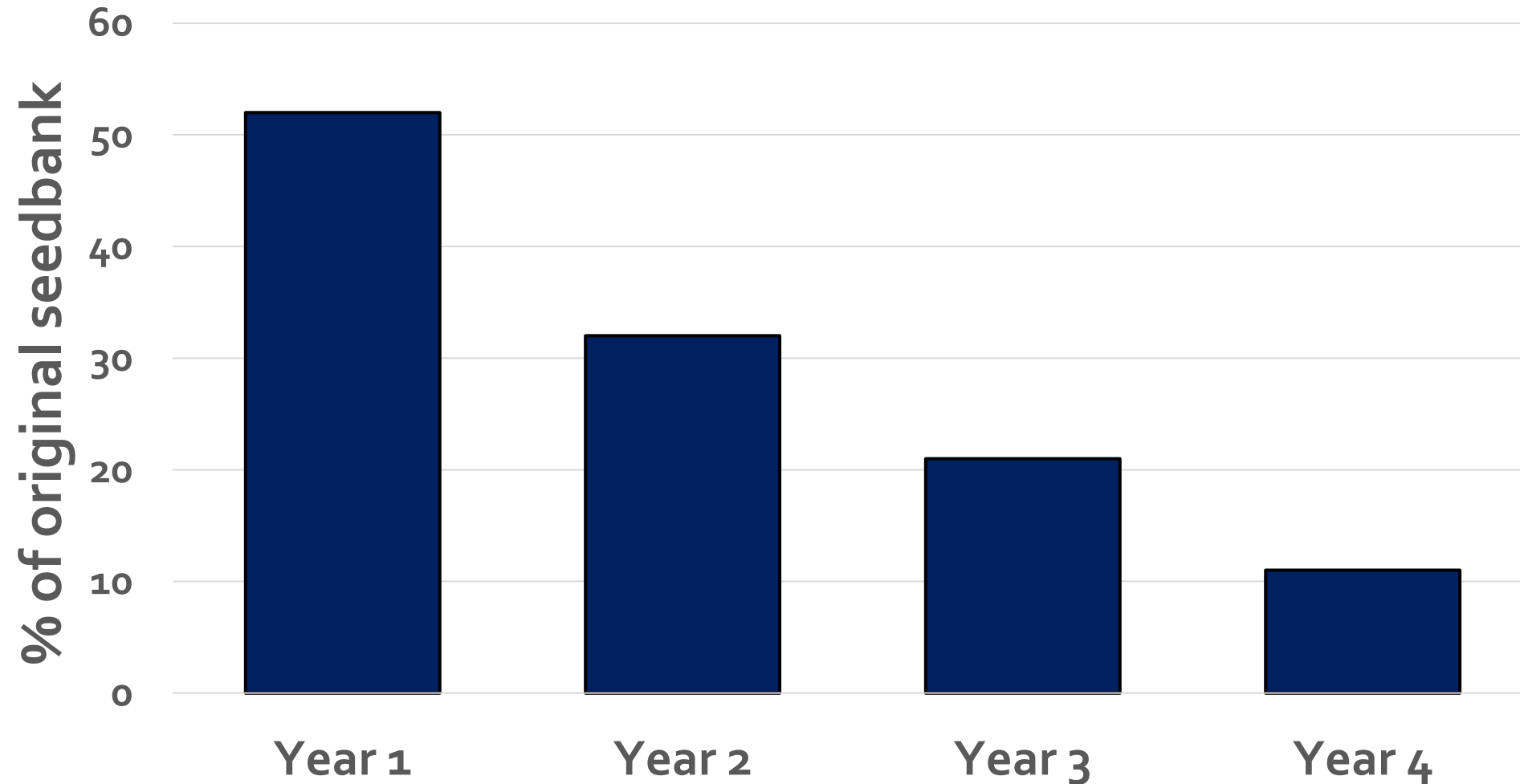


Waterhemp



Redroot pigweed

Percent of waterhemp seed viable four years following burial

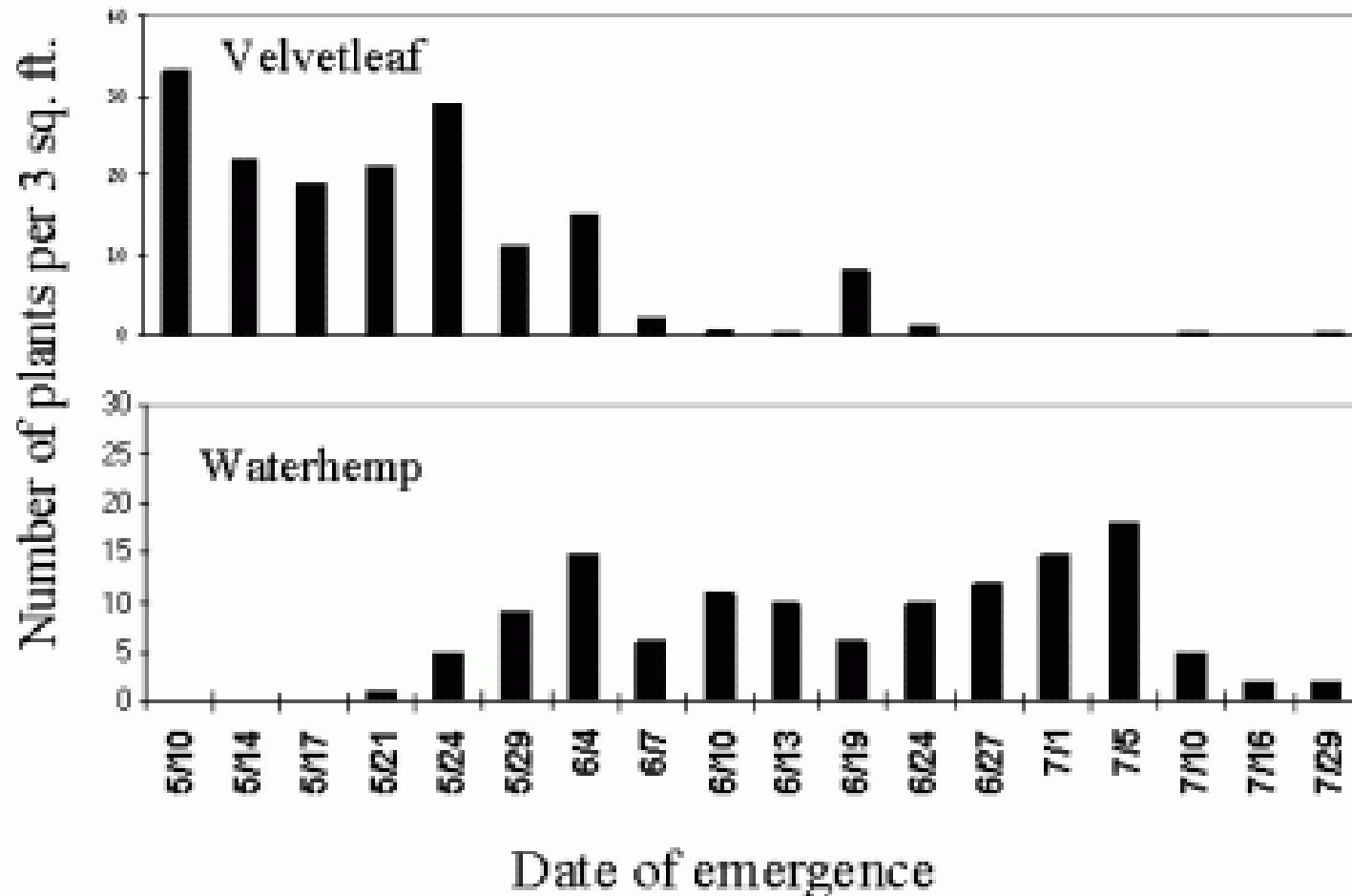


Source: Buhler and Hartzler, 2001. Weed Science: 49:230-235



Waterhemp emerged, image, May 22

Delayed and prolonged emergence of waterhemp creates weed management challenges



Etho might be our most versatile herbicide

| Rate (pt/A) | Response |
|-------------|---------------------------|
| 0.25 | With PowerMax POST |
| 0.38 | With PowerMax POST |
| 0.75 | With PowerMax POST |
| 1 | With S-metolachlor |
| 2 | With S-metolachlor |
| 3 | With S-metolachlor |
| 4 | Kochia control PRE |
| 5 | Kochia control PRE |
| 6 | PRE for waterhemp control |
| 7 | PRE for waterhemp control |

Nortron[®] SC
HERBICIDE



ETHOTRON[®]
HERBICIDE



Etho might be our most versatile herbicide



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| Treatment | Rate | Sgbt inj | | W. hemp cntrl | |
|-------------------------------|--------------------|----------|--------|---------------|---------|
| | | 12 DAT | 20 DAT | Mid | Harvest |
| | fl oz /A | % | % | % | % |
| PM / PM / PM | 28/28/22 | 1 | 0 | 63 de | 48 e |
| PM+Etho / PM + Etho / PM Etho | 28+4 / 28+4 / 22+4 | 2 | 1 | 76 c | 67 cd |
| P-value | | NS | NS | <.0001 | <.0001 |

- Add AMS at 1% weight or 2.5% v/v liquid (8.5 lb/100 G water)
- HSMOC (tank-mixes)
- Ethofumesate 4SC = 45 day PHI

Etho might be our most versatile herbicide



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How do I decide between ethofumesate or Dual Magnum PRE?

Ethofumesate (Nortron, Ethotron, Ethofumesate 4SC

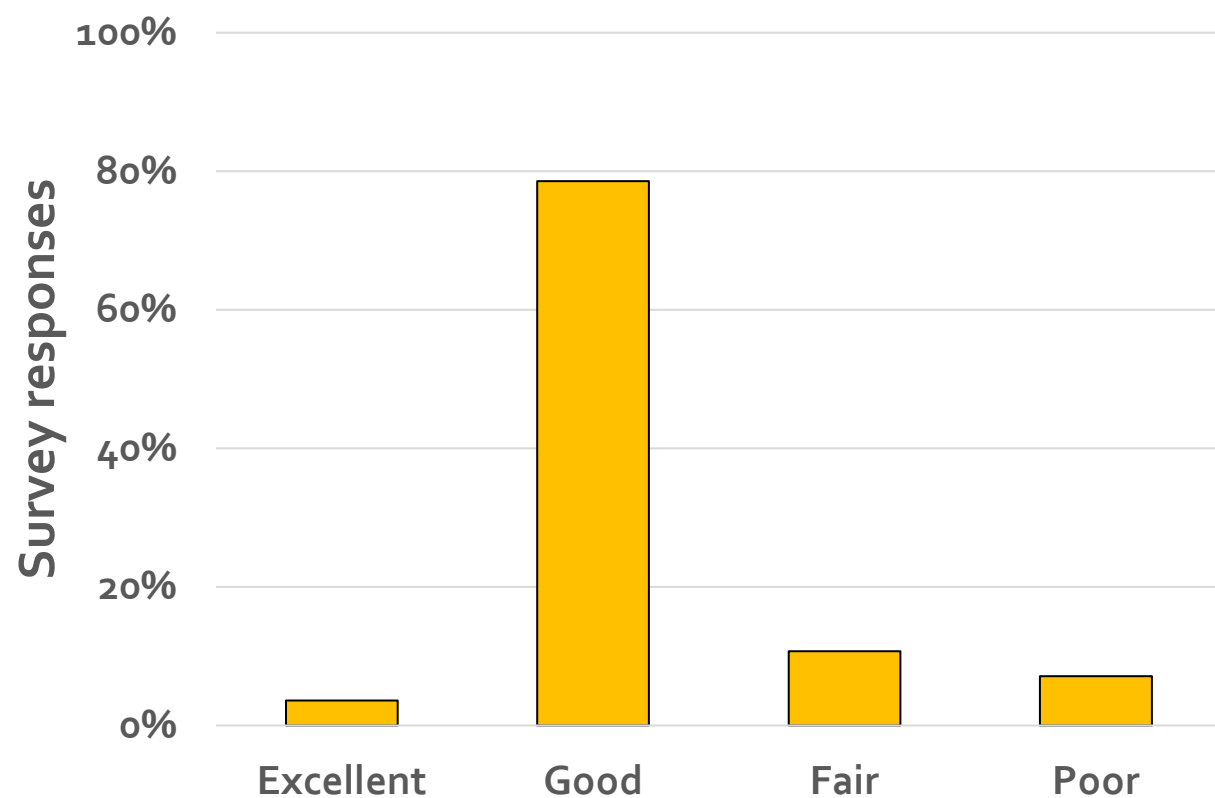
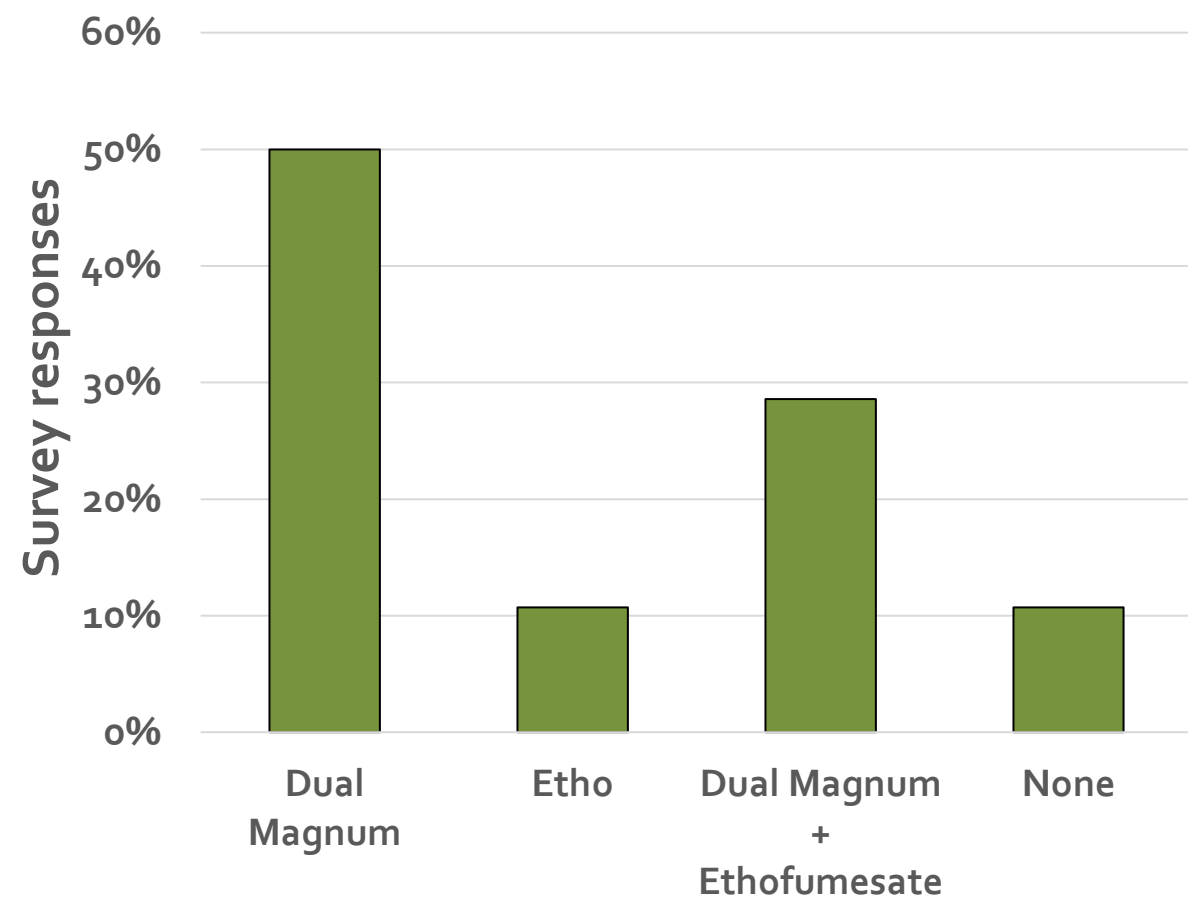
- Needs 0.75 in precipitation to activate
- History of safe use on sugarbeet PRE and POST
- \$25 per acre?

Dual Magnum

- Needs 0.5 inch precipitation to active
- Apply at 0.5 pt to 1.0 pt/A; safety greatest OM>3.5% or medium and fine texture
- Indemnified label
- \$7.50/acre

Which soil-applied herbicide (PPI or PRE) did you use in 2018?

How effective were your soil-applied herbicide applications?



^aTurning Point Survey of Growers; conducted at the 2019 Sugarbeet Growers Seminar, Wahpeton;

Etho might be our most versatile herbicide



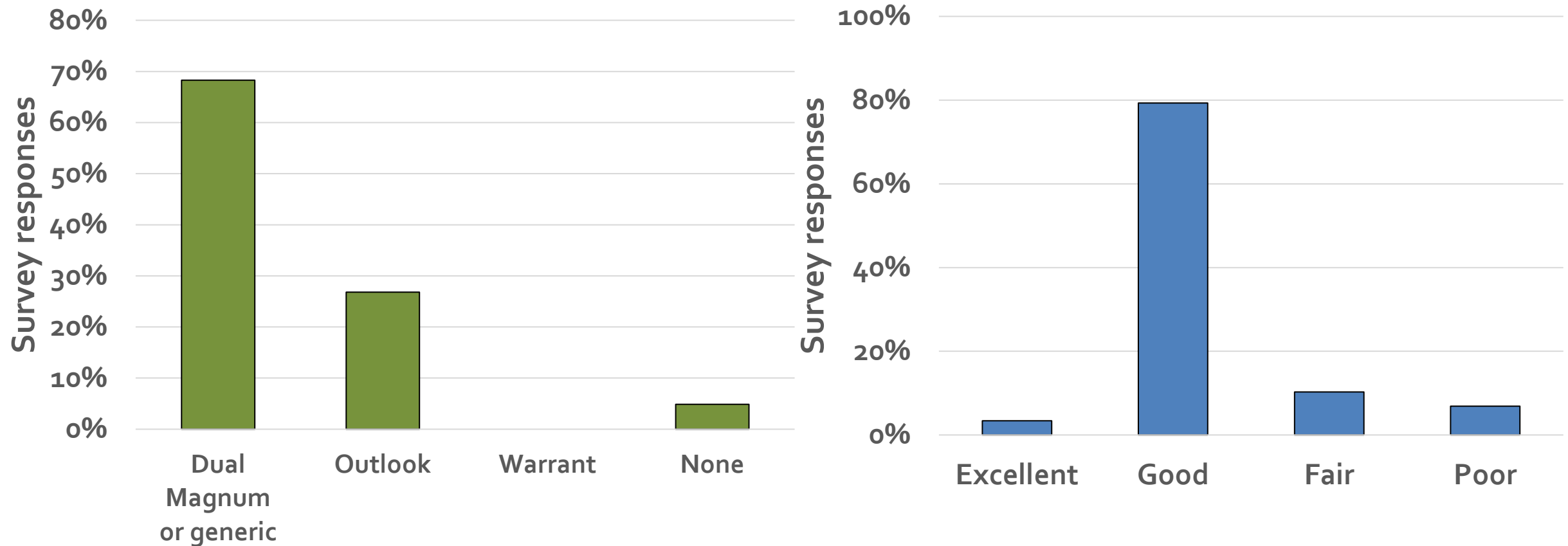
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Waterhemp (count per meter square) or as a percent of control , June 6, 2017, Lake Lillian, MN

| Herbicide | Rate | Application | Count | Visual Control |
|-------------|---------|-------------|--------------------|----------------|
| | fl oz/A | | Num/m ² | % |
| Dual Magnum | 8 | PRE | 25 b | 97 |
| PowerMax | 28 | EPOST | 192 c | 74 |
| Control | | | 727 a | |

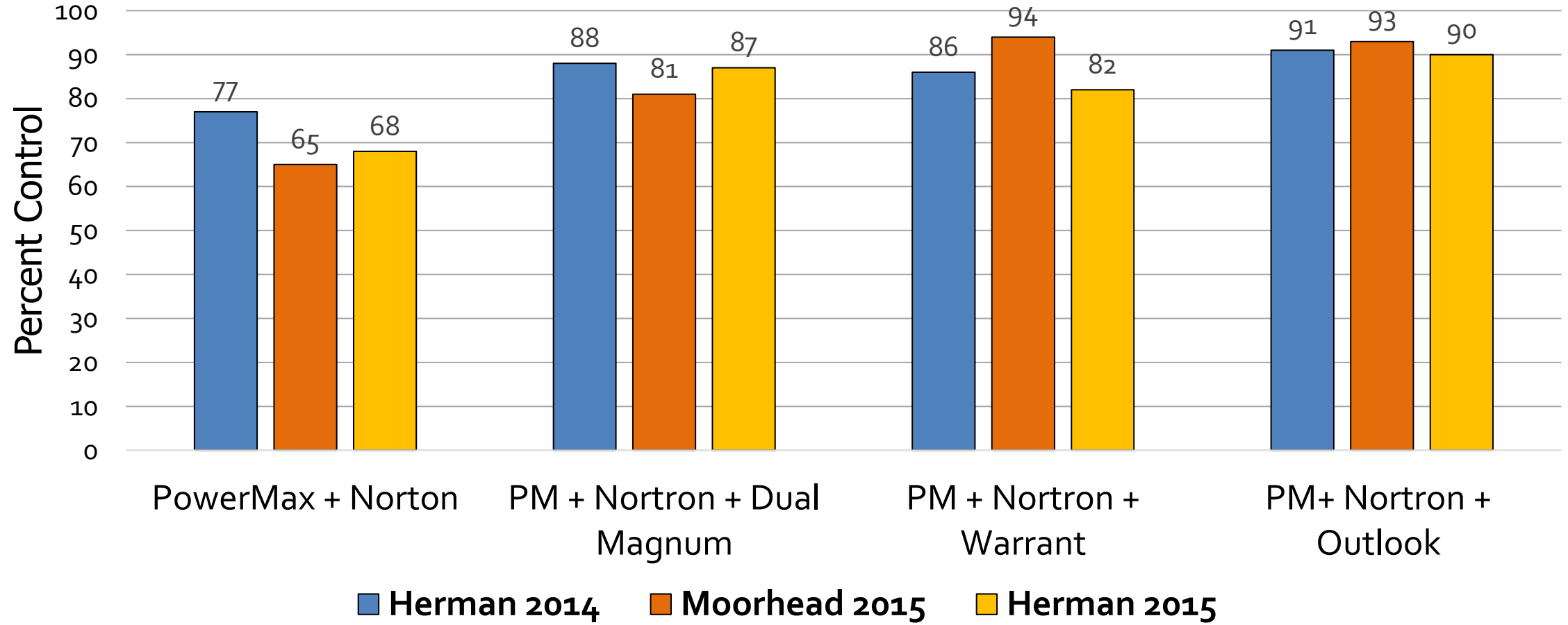
| Herbicide | Rate | Application | Count | Visual Control |
|--------------|------|-------------|--------------------|----------------|
| | pt/A | | Num/m ² | % |
| Ethofumesate | 2 | PRE | 53 bc | 93 |
| Ethofumesate | 3 | PRE | 20 cd | 97 |
| Ethofumesate | 4 | PRE | 07 d | 99 |
| PowerMax | 1.75 | EPOST | 116 b | 85 |
| Control | | | 792 a | |

Which soil-applied herbicide (lay-by) did you use in 2018? How effective were your (lay-by) herbicides?



^aTurning Point Survey of Growers; conducted at the 2019 Sugarbeet Growers Seminar, Wahpeton;

Waterhemp control from postemergence herbicides, across locations and years



How do you decide what product to use lay-by?

Risk management

- Replanting, select Dual Magnum
- Activation early, select Outlook
- Sugarbeet safety, Dual Magnum or War
- Length of control, Warrant
- Spectrum, Warrant
- Relationship with industry?
- Don't forget about the generic versions



Ethofumesate is an effective pigweed herbicide, SMBSC, 2019



Ethofumesate
fb Outlook +
Power Max at
14 + 32 fl oz/A

Outlook +
Power Max at
14 + 32 fl oz/A

Herbicide Preharvest Intervals (PHIs)

Ethofumesate products

- Ethofumesate 4SC (Generic Crop Science) – 45 day
- Nortron (Bayer) – 90 day
- Ethotron (UPL) – 90 day

Chloroacetamide Products

- Dual Magnum (Syngenta) – 60 day
- Outlook (BASF) to 8 lf – 60 day
- Outlook (BASF) to 12 lf – 90 day
- Warrant (Bayer) 75 day



Foxhome 2019



Spray program

- **PRE, Band** - 2 pint Nortron + 1/2 pint Dual Magnum
- **1st Post, Band** - 10 oz Betamix + 4 oz Nortron + 2 oz Stinger + 28 oz Roundup + AMS + NIS
- **2nd Post, Broadcast** - 28oz Roundup + 1 pint S-metolachlor
- **Cultivation** at the 10-12 lf, 5 to 7 day break and cultivate the opposite direction

Final thoughts

- Weekly scouting and action plans are important
 - Know your target weeds
 - Don't let small weeds sneak become big weeds
- Have a backup plan in the event mother nature does not cooperate
- Weed management continues to next years crop in the field



Spray Tank Cleanout Issues

- We've all seen it...no one likes it. Embarrassing for the applicator and detrimental to your crop: can cause stand loss and yield loss
- A challenge due to increased number herbicides and herbicide mixtures involving multiple actives



Sprayed Dual Magnum + glyphosate + Stinger + etho + Flame. Beets had speckling from the DM and etho but also significant necrosis. Sprayer sat for two hours due to breakdown

The down time may have provided an opportunity for glyphosate to dislodge dried chemical residue [Fierce (Zidua + Valor)] residues used previously in soybean



Harness Max was applied to corn. Max is Harness plus mesotrione. Grower rinsed with tank-cleaner and flushed with 1,000-gallon water.

Sprayer was not cleaned properly and HPPD symptoms were seen on sugarbeet. Triple rinse using smaller volumes of water. Use cleaner on second rinse and let stand over night. Clean screens, end caps, and make sure the tank is free of residues



Where Pesticide Residue Hides

Primary Locations

- Tanks
- Hoses
- Boom Lines
- Valves
- Screens
- Nozzle Bodies
- Pumps
- End Caps

Secondary Locations

- Inductor Cones
- Water Hoses
- Sprayer Tires
- Sprayer Frame
- Nurse Tanks



Sprayer cleanout

Cleaning a sprayer is like washing dishes

- Don't allow the hard stuff to solidify
- Use the correct detergent (solvent)
- Be thorough; take your time
- Rinsing properly before relaxing



Seven Steps of Sprayer Tank Cleanout

Adopted from (Purdue Extension PPP-108)

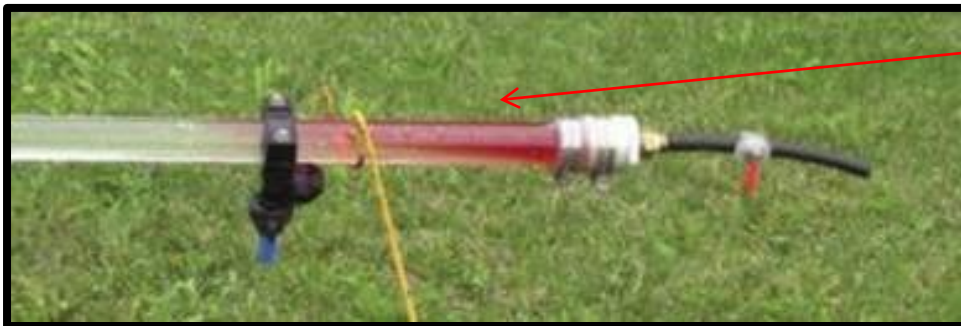
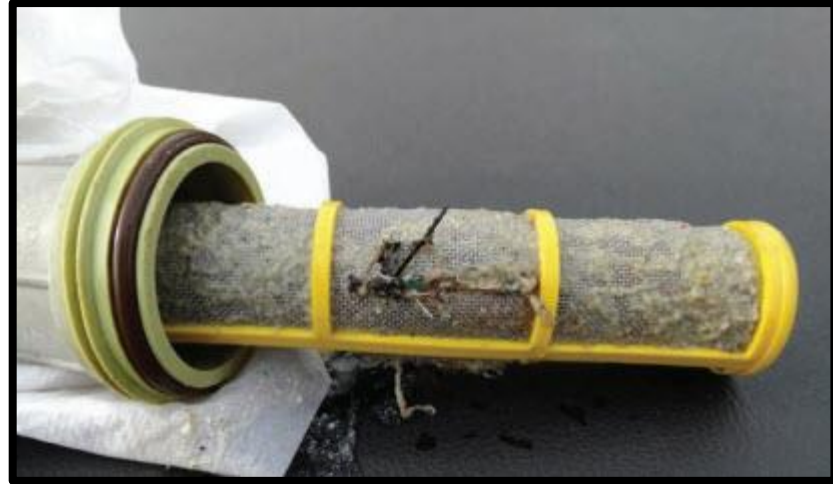
Pictures from Vern Hofman NDSU and Purdue Extension

1. Flush sprayer every night
 - Don't let spray solution sit overnight
 - Flush spray solution from tank, lines, boom
2. 1st rinse in field
 - Removes concentrated spray mix before cleaning process
 - Rinse until water exiting nozzles is clear



Seven Steps of Sprayer Tank Cleanout

3. Remove and clean all screens
 - Use a brush and soapy water
4. Remove and clean boom end caps
 - Scrape away any residue inside
5. 2nd Rinse with water



example of a
dead end on a
spray boom
section



Seven Steps of Sprayer Tank Cleanout

6. Add tank cleaner

- Agitate and circulate
- Let the cleaner sit
- Flush the cleaner from the system

Vern Hofman NDSU
and Purdue Extension



7. Final rinse and flush with water

- Clean outside of sprayer

(Purdue Extension
PPP-108)

Cotton Grower



These steps are general for all sprayers, but...

- Know your sprayer
 - Where can residues hide? Where are my valves? Screens? Hoses?
 - Consult your Operator's manual
- Develop a checklist
- Know the physical properties of the chemical you're applying
 - Granular vs. EC vs. Solution
 - Jar mix to test incompatibility

Choosing the Right Tank Cleaner

- Refer to label for correct cleaner
- Know what chemical you're spraying & its properties
- Know the condition of your sprayer

Xtendimax Label
with cleanout
procedures

application may be made to crops (including pastures) and non-cropland areas described in this label except for non-dicamba-tolerant cotton, sorghum, and non-dicamba-tolerant soybean.

9.5 Proper Spray System Equipment Cleanout

You must ensure that the spray system used to apply this product is clean before using this product.

Failure to properly clean the entire spray system can result in inadvertent contamination of the spray system. Small quantities of dicamba may cause injury to non-dicamba tolerant soybeans and other sensitive crops (see Section 9.1.4 of this label for more information).

Inadvertent contamination can also occur in equipment used for bulk product handling and mixing prior to use in the spray system. Care should be taken to reduce contamination not only in the spray system but in any equipment used to transfer or deliver product. For example, bulk handling and mixing equipment containing this product should be segregated when possible to reduce potential for cross-contamination. Consider using block and check valves to avoid backflow during transfer. Piping should be reviewed to ensure there not potential for product build-up. Dedicated nurse trucks and tender equipment should be used when possible.

Clean equipment immediately after using this product, using a triple rinse procedure as follows:

1. After spraying, drain the sprayer (including boom and lines) immediately. Do not allow the spray solution to remain in the spray boom lines overnight prior to flushing.
2. Flush tank, hoses, boom and nozzles with clean water. If equipped, open boom ends and flush.
3. Inspect and clean all strainers, screens and filters.
4. Prepare a cleaning solution with a commercial detergent or sprayer cleaner or ammonia according to the manufacturer's directions.
5. Take care to wash all parts of the tank, including the inside top surface. Start agitation in the sprayer and thoroughly recirculate the cleaning solution for at least 15 minutes. All visible deposits must be removed from the spraying system.
6. Flush hoses, spray lines and nozzles for at least 1 minute with the cleaning solution.
7. Remove nozzles, screens and strainers and clean separately in the cleaning solution after completing the above procedures.
8. Drain pump, filter and lines.
9. Rinse the complete spraying system with clean water.
10. Clean and wash off the outside of the entire sprayer and boom.
11. All rinse water must be disposed of in compliance with local, state, and federal guidelines.

10.0 ADDITIONAL RESTRICTIONS

Maximum Application Rates: The maximum application or use rates stated throughout this label are given in units of volume (fluid ounces or quarts) of this product per acre. However, the maximum allowed application rates apply to this product combined with the use of any and all other herbicides containing the active

| | | | |
|--|-----|-----|------------------|
| Conservation Reserve Program (CRP) | 44 | 88 | Yes |
| Corn | 22 | 33 | Yes ² |
| Cotton | 11 | 11 | Yes |
| Cotton with XtendFlex Technology | 44 | 88 | Yes |
| Fallow Ground | 44 | 88 | Yes |
| Grass grown for seed | 44 | 88 | Yes |
| Oats | 5.5 | 5.5 | Yes |
| Pastureland | 44 | 44 | Yes |
| Proso Millet | 5.5 | 5.5 | Yes |
| Small grains grown for grass, forage, fodder, hay and/or pasture | 22 | 22 | Yes |
| Sorghum | 11 | 22 | Yes |
| Soybean | 44 | 44 | Yes |
| Roundup Ready 2 Xtend Soybean and XtendFlex Soybean | 44 | 88 | Yes |
| Sugarcane | 44 | 88 | Yes |
| Triticale | 5.5 | 5.5 | Yes |
| Sod farms and farmstead turf | 44 | 44 | Yes |
| Wheat | 11 | 22 | Yes |

¹ Refer to section 11. CROP-SPECIFIC INFORMATION and section 12. CROPS WITH XTEND TECHNOLOGY for more details.

² Once the crop reaches the ensilage (milk) stage or later in maturity

11.0 CROP-SPECIFIC INFORMATION

Read Sections: 8.0 for Tank Mixing Instructions and 9.1.4 for Buffer Requirements and Sensitive Crops for information on tank mixing, buffer requirements, and sensitive crops.

11.1 Asparagus

Apply XtendiMax® With VaporGrip® Technology to emerged and actively growing weeds in 40 - 60 gallons of diluted spray per treated acre immediately after cutting the field, but at least 24 hours before the next cutting. Multiple applications may be made per growing season.

If spray contacts emerged spears, crooking (twisting) of some spears may result. If such crooking occurs, discard affected spears.

Rates: Apply 11-22 fluid ounces of XtendiMax® With VaporGrip® Technology to control annual sowthistle, black mustard, Canada and Russian thistle, and redroot pigweed (carelessweed).

Types of Tank Cleaner

- Ammonia - increases the pH of the solution
- Bleach - lowers the pH of the solution
- Detergents – cleaners
- Commercial tank cleaners – usually contain ammonia and a detergent



List of Tank Cleaners for Herbicides

- Authority MTZ - Ammonia with TC
- Authority Assist – Ammonia or TC
- Cadet - Ammonia and TC
- Raptor – Water
- Flexstar – Tank Cleaner
- Valor – Ammonia or TC
- Armezon Pro – Tank Cleaner
- Harness Max - Ammonia or TC
- Tripleflex – Ammonia or TC
- Callisto – Ammonia
- Capreno – Bleach
- Gramoxone – Tank Cleaner

- Dicamba – Ammonia with TC
- 2, 4-D – Ammonia
- Harmony – Water
- Express - Water
- Affinity Broadspec - Water
- Sentrallas – Ammonia
- Supremacy - Ammonia
- Huskie Complete – Ammonia
- Goldsky – Ammonia
- Everest – Ammonia
- Varro – Ammonia
- Widematch - Ammonia

Helpful Equipment Add-Ons

- Stainless steel tanks & boom lines
- Polyethylene hoses
- Tank rinse nozzles
- Clean water reservoirs
- Continuous rinse system
- Nozzle endcaps
- Direct injection
- Don't sell a used sprayer and dedicate it to a specific crop

Nozzle Body End Cap



Direct Injection System



How Clean is Clean Enough?



Acknowledgements

- Sugarbeet Research and Education Board for supporting our ideas
- Our cooperators: Glenn and Danny Brandt (Ada), Dallas Loff (Galchutt), Mike Moen (Galchutt), Tim and Michael Backman (Herman), Vince Ulstad (Hickson), Brian and Chris Schlegal (Lake Lillian), Pinta Brothers (Minto), American Crystal Sugar (Moorhead), Troy Koltes (Nashua), James Bergman and Ransel Anderson (Oslo) , Matt Ness (Wolverton)
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- North Dakota State University Experiment Station and Crookston Research and Outreach Center

Thank you for your Support

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