Advanced Crop Advisors Workshop–

Herbicide Layers for Licking Weeds

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TAKE-HOME POINTS:

- Know your weeds
  - Annual, biennial, or perennial
  - What are the emergence patterns?
    - Time and duration of emergence matter
  - Are they resistant to any herbicides?
  - When do the weed seeds become viable?
  - How long do the weed seeds survive in the soil?

- How does weed biology affect weed control?
  - Timing is key – improve timing to capitalize on what you're already doing
  - Layered residual herbicides target late emerging weeds
    - Waterhemp is a good example

- For known herbicide-resistant weeds
  - Prevent seed production

COMMON MISUNDERSTANDINGS ABOUT CORN AND SOYBEAN WEED MANAGEMENT

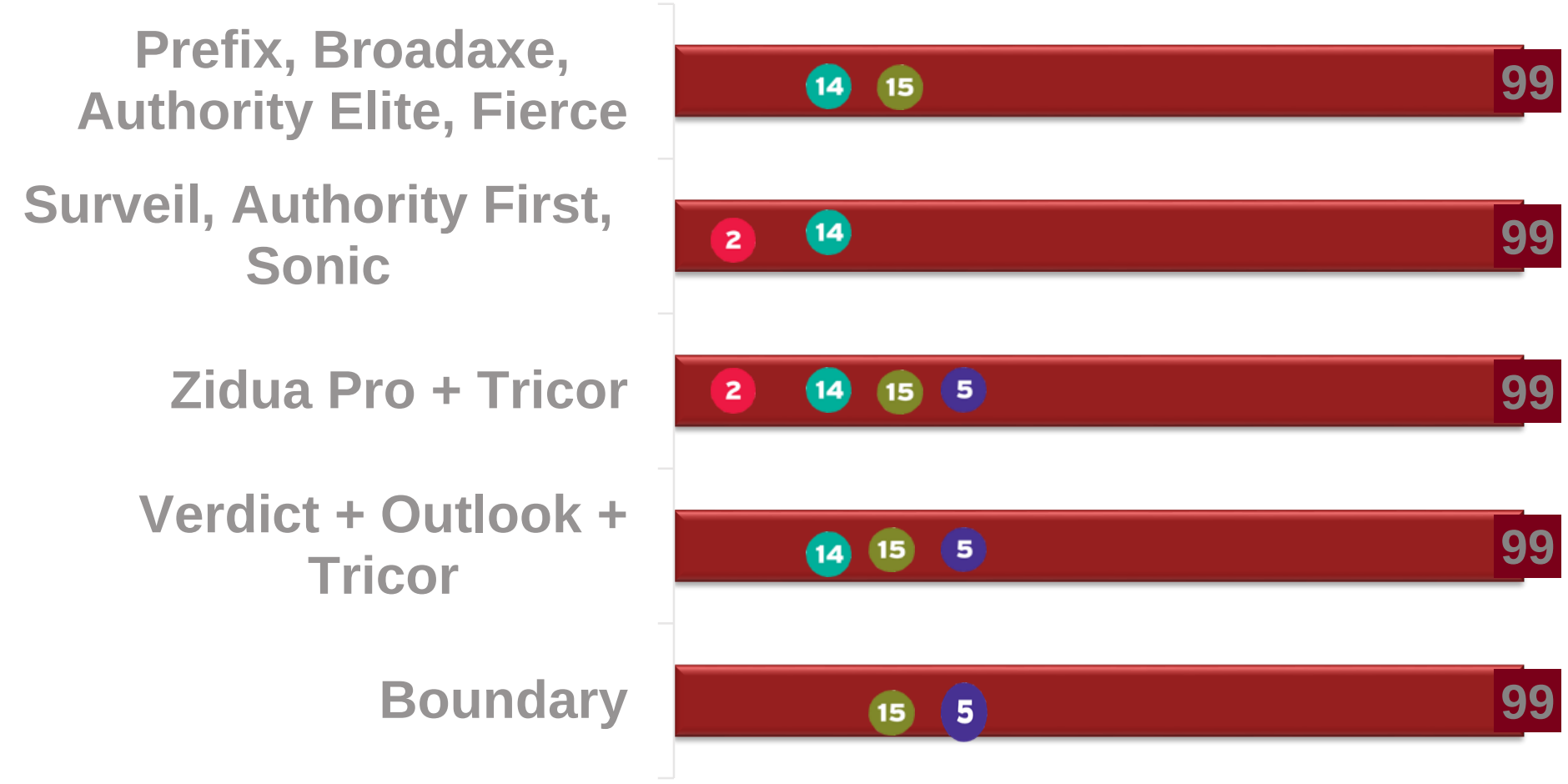
1. Preemergence herbicides that don't receive an early incorporating rainfall are a failure and a waste of money.
2. Wait until all of the weeds come up before applying an early- or mid-postemergence herbicide.
3. An effective total postemergence herbicide program is superior to a preemergence followed by postemergence approach.
4. When you find an effective herbicide stick with it.
5. If weed resistance develops, the agrichemical industry will come up with something new.
6. Dicamba is a consistently effective tall waterhemp herbicide.
7. July is an effective time to clean up fields with postemergence herbicides.

Start the Growing Season with a Good Preemergence Foundation

Choose a PRE herbicide that controls your major weeds

1. **A PRE can be used on conventional, glyphosate, Liberty, or dicamba technologies**
2. **Benefits:**
   - ***Decrease*** **weed density and species**
   - ***Uniform*** **size of weeds for POST**
   - ***Increases*** **window to get post programs done**
   - **Able to diversify herbicide Groups**

GOOD FOUNDATIONS IN SOYBEAN GAVE OVER 95% WATERHEMP & LAMBSQUARTERS CONTROL IN 2016



Exponential Growth of Giant Ragweed & Waterhemp

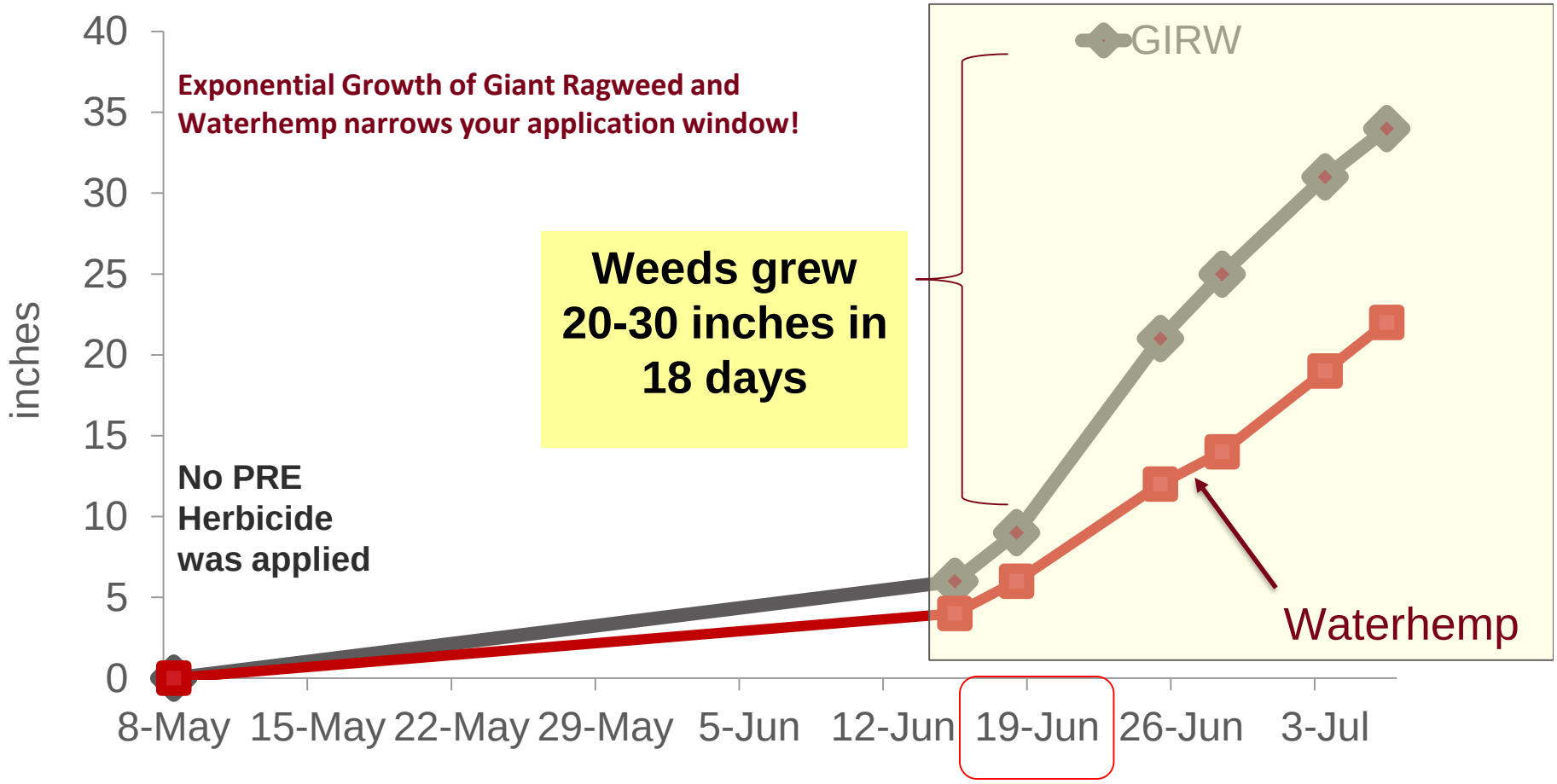
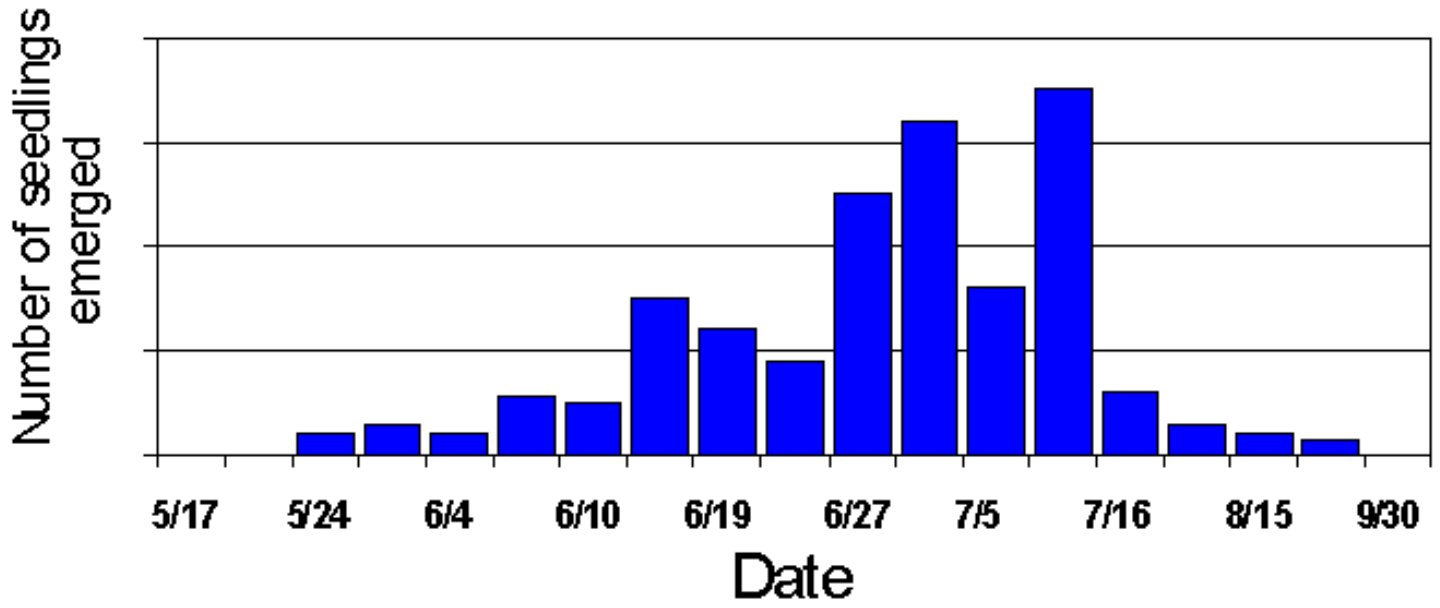
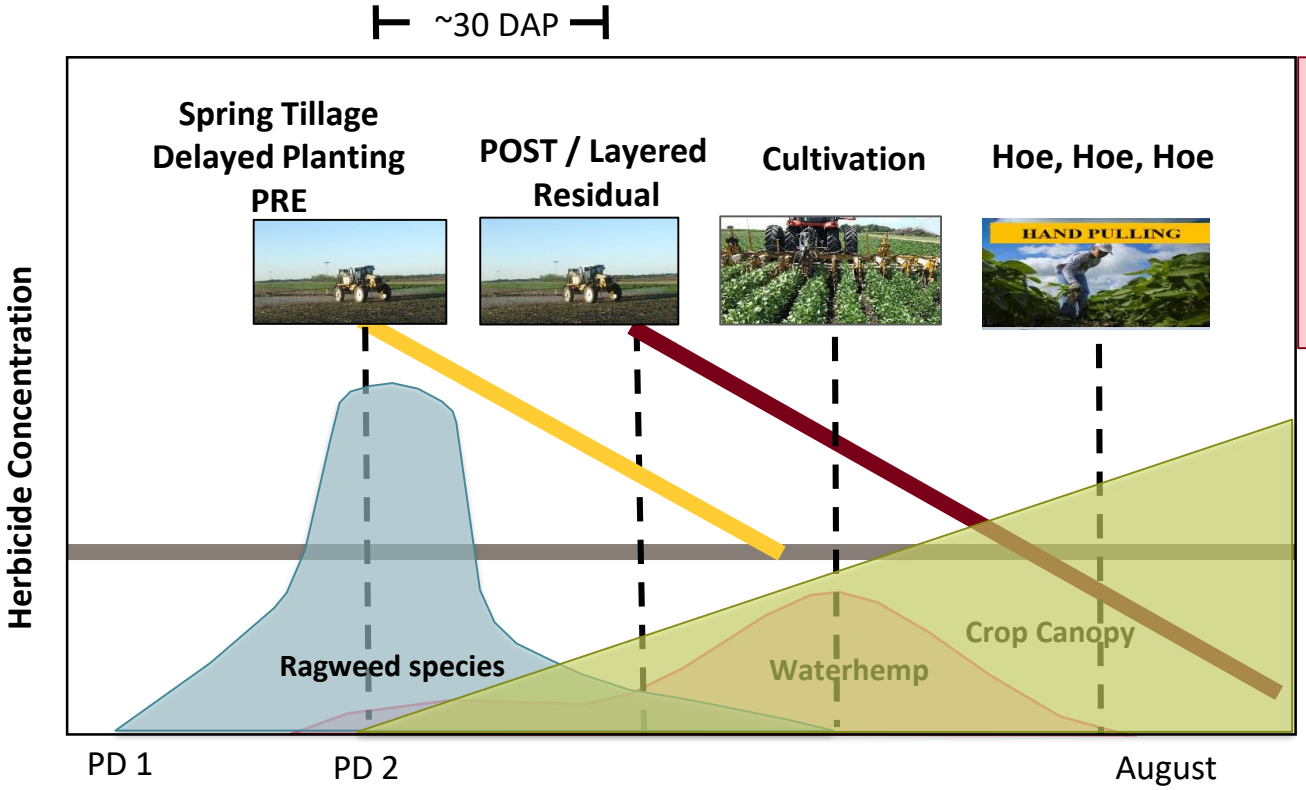


Figure 1. Waterhemp emergence pattern.

Hartzler and Buhler. 1999. Weed Sci. 47:578-584.



UNDERSTANDING WEED BIOLOGY HELPS YOU TO INTEGRATE YOUR TACTICS



Goal = to prevent seed production

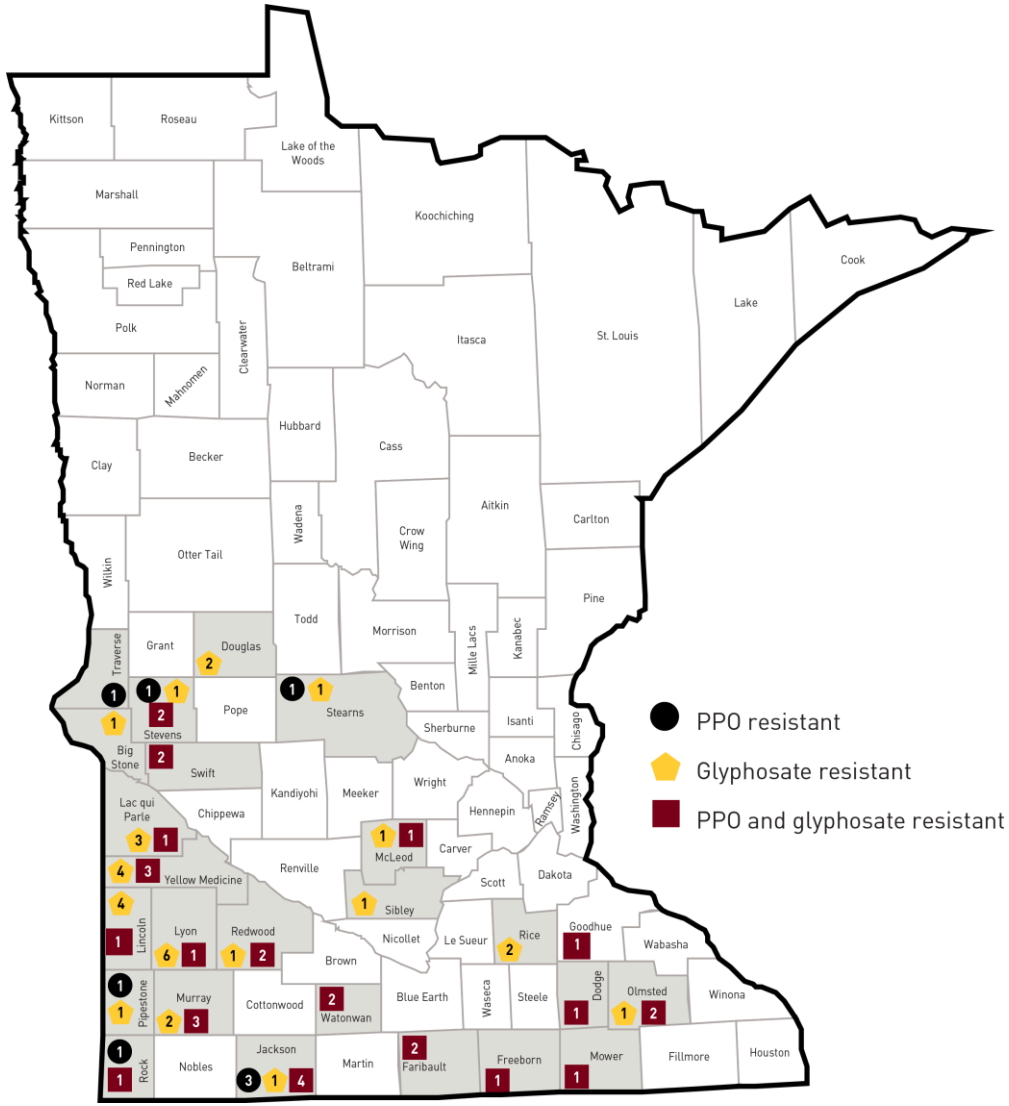
IS LAYERING OF HERBICIDES AN EFFECTIVE RESISTANCE MANAGEMENT STRATEGY?

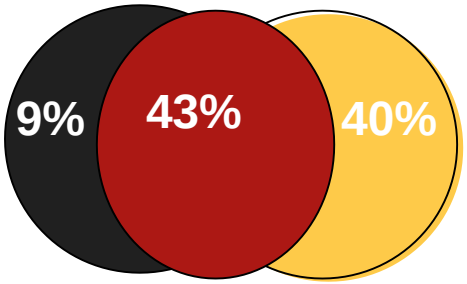
- There are a number of problems in managing herbicide-resistant weeds
  - Time management
  - Economic concerns
  - Farmer knowledge
    - Educational needs include weed biology and weed/crop interaction
  - Lack of new herbicides
    - Newest herbicide group > 30 years old

Waterhemp

Multiple Resistance is a Growing Problem

CONFIRMED PPO AND GLYPHOSATE RESISTANT TALL WATERHEMP - 2018





8% sensitive to PPO and glyphosate

Plants Not Tested for ALS (SOA#2) resistance

86 Total samples
52% PPO resistant
83% Glyphosate resistant (gene amplification)
8% Sensitive to PPO & Glyphosate

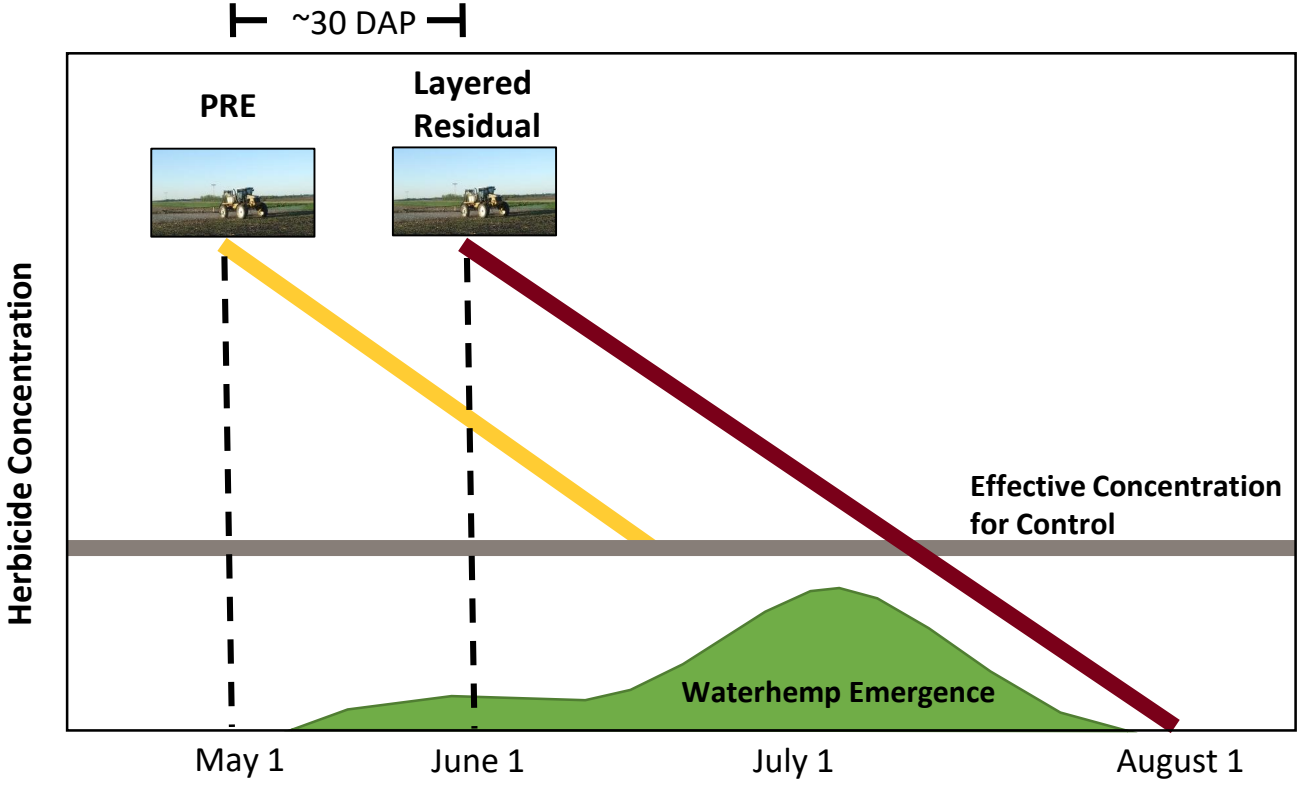
University of Illinois – Plant Clinic Diagnostic Reports

DIFFERENT MANAGEMENT STRATEGIES NEEDED FOR GLYPHOSATE-, PPO- AND ALS- RESISTANT WATERHEMP

HTTPS://EXTENSION.UMN.EDU/HERBICIDE-RESISTANCE-MANAGEMENT/MANAGING-WATERHEMP-LAYERED-RESIDUAL-HERBICIDES

- **One Strategy = Layer soil residual herbicides**
- **Group-15 followed by Group 15** (Dual, Outlook, Warrant, Zidua)
- **Group 14** (Valor) **followed by Group 15**
  - **Preemergence (PRE)** (Kills weeds as they germinate) **followed by**
  - **Early Post ~ 30 days after PRE (DAP)**
    - **Need herbicide to control any emerged weeds**

LAYERED HERBICIDE CONCEPT



Layered Residual Herbicides in Control of Waterhemp – 2016 Results

Treatment[1]	Rate	Appl.[2]	5/27/16	6/10/16	6/27/16	7/8/16	9/26/16	YIELD
Herbicide	Per acre	Time	(% Control)[3]					(Bu/A)[4]
Dual II Magnum	1.5 pt	A	98	90	78	72	76	46
Dual II Magnum / Dual II Magnum	1.5 pt / 1.0 pt	A C	99	96	93	92	94	48
Outlook	18 fl oz	A	98	98	80	76	79	50
Outlook / Outlook	14 fl oz / 10 fl oz	A C	98	98	96	95	95	52
Warrant	1.6 qt	A	97	85	80	80	79	42
Warrant / Warrant	1.6 qt / 1.6 qt	A C	97	97	91	91	91	53
LSD P = 0.10			NS	3	4	8	7	6.5

1. All PRE treatments included 0.6 fl oz FirstRate
2. Application date: A = PRE: 5/4/16, C = POST: 6/2/16
3. Waterhemp density on June 17 was 41/sq ft in FirstRate check
4. FirstRate check yielded 28 Bu/A

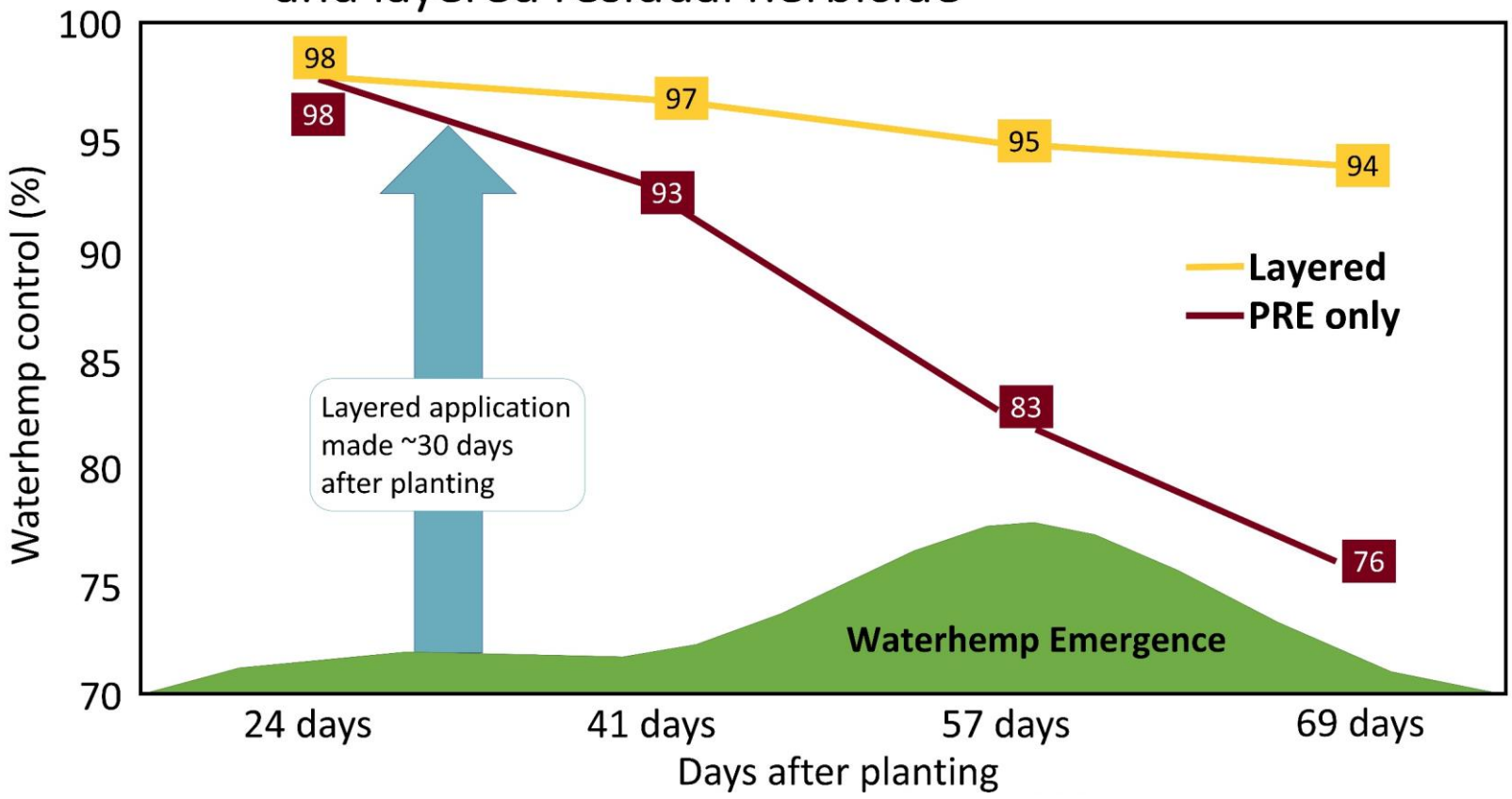
PRE only application of Outlook (left) and layered PRE/POST applications of Outlook May 5 and June 8 (right)

Photos taken July 14, 2015.

PRE only application of Outlook (left) and layered PRE/POST applications of Outlook May 5 and June 8 (right)

Photos taken August 27, 2015.

Waterhemp control over time with residual and layered residual herbicide



WATERHEMP CONTROL RESIDUAL HERBICIDES APPLIED AS LAYERED PRE/POST AT 20, 29 OR 44 DAP IN 2016

Treatment[1]	Rate	Appl.[2]	5/27/16	6/10/16	6/27/16	7/8/16	9/26/16	YIELD
Herbicide	Per acre	Time	(% Control)[3]					(Bu/A)[4]
Dual II Magnum/ Dual II Magnum (20 DAP)	1.5 pt / 1.0 pt	A B	98	98	94	93	93	52
Dual II Magnum/ Dual II Magnum (29 DAP)	1.5 pt / 1.0 pt	A C	99	96	93		94	48
Dual II Magnum/ Dual II Magnum (44 DAP)	1.5 pt / 1.0 pt	A D	99	93	85	83	83	48
LSD P = 0.10			NS	2.6	2.2	3.5	6	NS

Is this 11% difference of any biological or agronomic significance?

1. All PRE treatments included 0.6 fl oz FirstRate
2. Application date: A = PRE: 5/4/16, C = POST: 6/2/16, D = POST: 6/17/16
3. Waterhemp density on June 17 was 41/sq ft in FirstRate check
4. FirstRate check yielded 28 Bu/A

Figure 1. Waterhemp emergence pattern.

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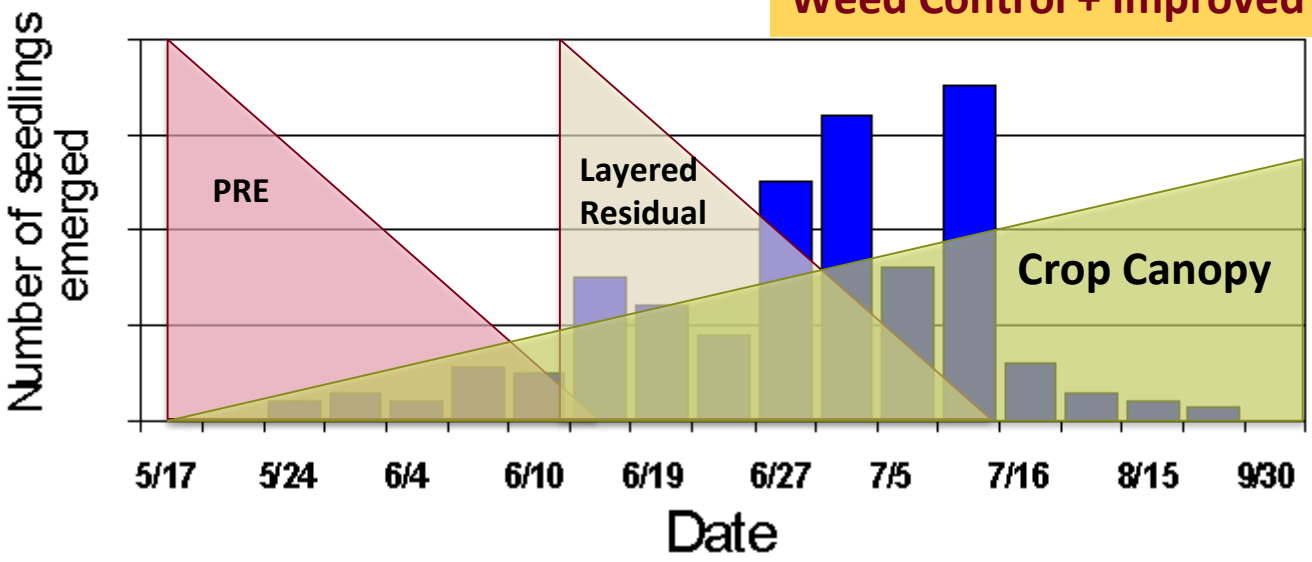
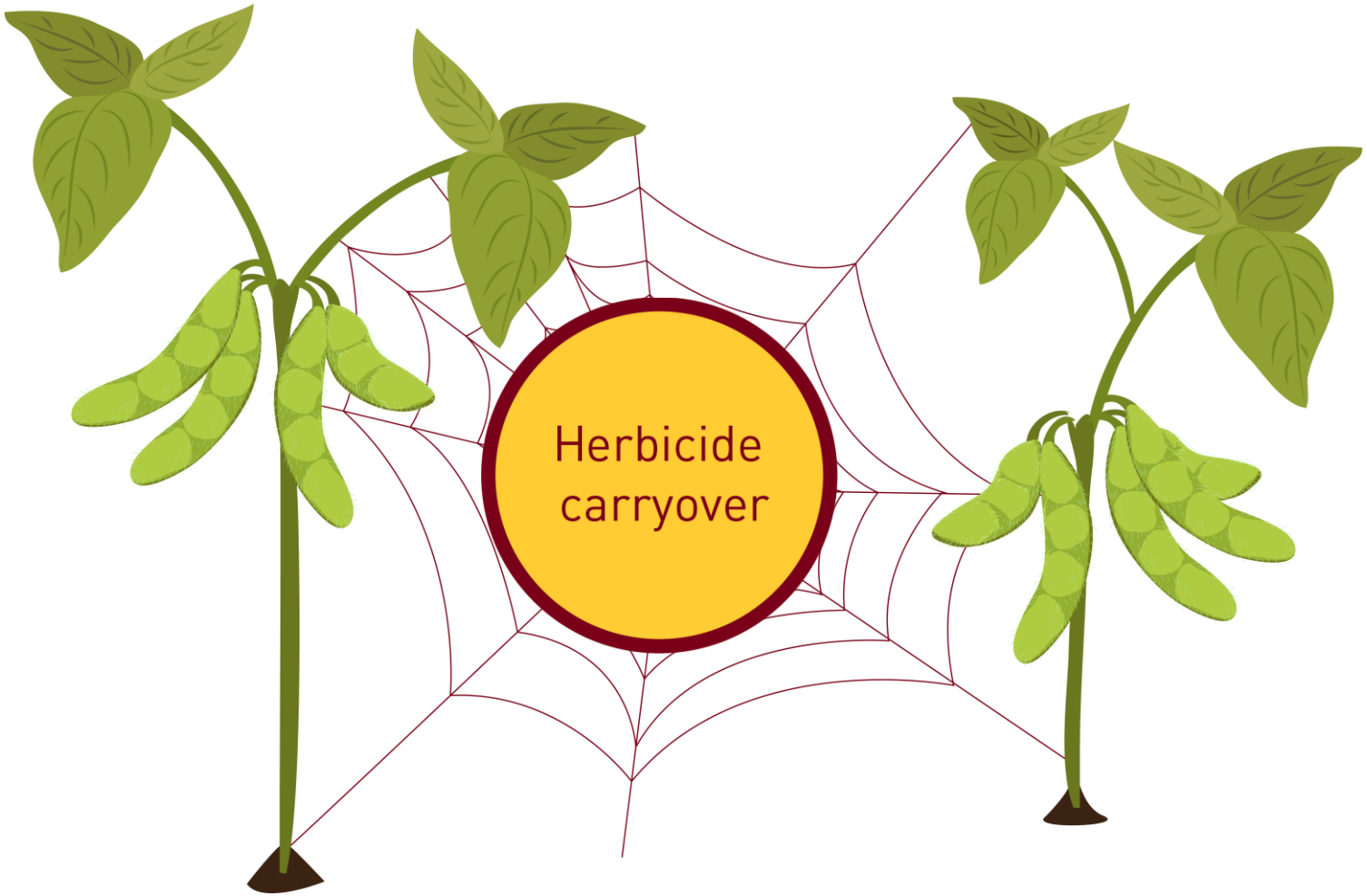
Manage for a competitive crop canopy
Weed Control + Improved Yield



Herbicide resistance: What a tangled web we weave



PREVENTING FLEXSTAR CARRYOVER

- Follow the label – Note rate w/in a geographic area and use every other year
- Avoid applications in July
  - 10 month rotation to corn
  - Est. ≥ 38 ppb may cause injury

South of I-94

REGION 4
(Maximum Rate 1 pt/A, alternate years)

South of Hwy 2 (excluding areas In Region 4) + Beltrami, Clearwater, Lake of the Woods, Kittson, Marshall, Pennington, Polk, Red Lake and Roseau counties

REGION 5
(Maximum Rate 0.75 pt/A, alternate years)

FLEXSTAR'S ROLE IN ADDRESSING HERBICIDE RESISTANT WEEDS

- Flexstar and Cobra (SOA#14) have been heavily relied on to address late-emerging waterhemp

- Cobra tends to induce more soybean injury than does Flexstar

- Cobra's time of application is only limited to a 45 day preharvest interval; Flexstar is more restrictive due to crop rotation restrictions

UNTANGLING THE WEB- MANAGING THE WEED SEED BANK

- Focus on early-season weed control
  - April through June
  - Start with a strong soil residual herbicide program in both corn and soybean
    - Corn has excellent PRE premixtures
    - Soybean layered PRE's have been effective on waterhemp
- Rotate to a more competitive crop
- Pull, mow, cultivate before weed seed set
- Zero weed thresholds have impact
  - But it may require more than herbicides to be effective

UNTANGLING THE WEB- EARLY SEASON WEED CONTROL

- Focus on early-season weed control
  - April through June
  - Start with a strong soil residual herbicide program in both corn and soybean
    - Corn has excellent PRE premixtures
    - Soybean layered PRE's have been effective on waterhemp

Multiple resistant weeds

- Set your goal for all postemergence applications to be completed by the end of June – June 20th for dicamba
  - Target weeds <4 inches tall

Herbicide carryover

Multiple resistant weeds

UNTANGLING THE WEB- SOUND AGRONOMIC PRACTICES

Herbicide carryover

- Don’t forget about sound agronomic practices
- The key to effective weed management is to shift the competitive advantage away from the weeds and in favor of the crop
- Addressing issues such as SCN and IDC is a sound **weed management** practice

Reduced soybean canopy closure

Weed mobility