



# **Dry Bean Weed Control Update**

**Joe Ikley**

**Extension Weed Specialist**

**1/31/2020**

# Dry Bean Updates

- Cover Crops for Weed Control?
- Tolerance to Ultra Blazer
- Ragweed is getting tougher
- Waterhemp marches west

# Cover Crops for Weed Control?

**Table 16. Reasons for cover crop use on dry bean fields in 2018.**

| Cover crop practice   | Respondents (no.) | Respondents (%) <sup>a</sup> |
|-----------------------|-------------------|------------------------------|
| <b>Minnesota</b>      |                   |                              |
| Soil conservation     | 28                | 93.3                         |
| Weed control          | 4                 | 13.3                         |
| Moisture conservation | 0                 | 0                            |
| Biodiversity          | 1                 | 3.3                          |
| No reason given       | 1                 | 3.3                          |
| <b>North Dakota</b>   |                   |                              |
| Soil conservation     | 17                | 100                          |
| Weed control          | 1                 | 5.9                          |
| Moisture conservation | 2                 | 11.8                         |
| Biodiversity          | 0                 | 0                            |
| No reason given       | 0                 | 0                            |
| <b>Northarvest</b>    |                   |                              |
| Soil conservation     | 45                | 95.7                         |
| Weed control          | 5                 | 10.6                         |
| Moisture conservation | 2                 | 4.3                          |
| Biodiversity          | 1                 | 2.1                          |
| No reason given       | 1                 | 2.1                          |

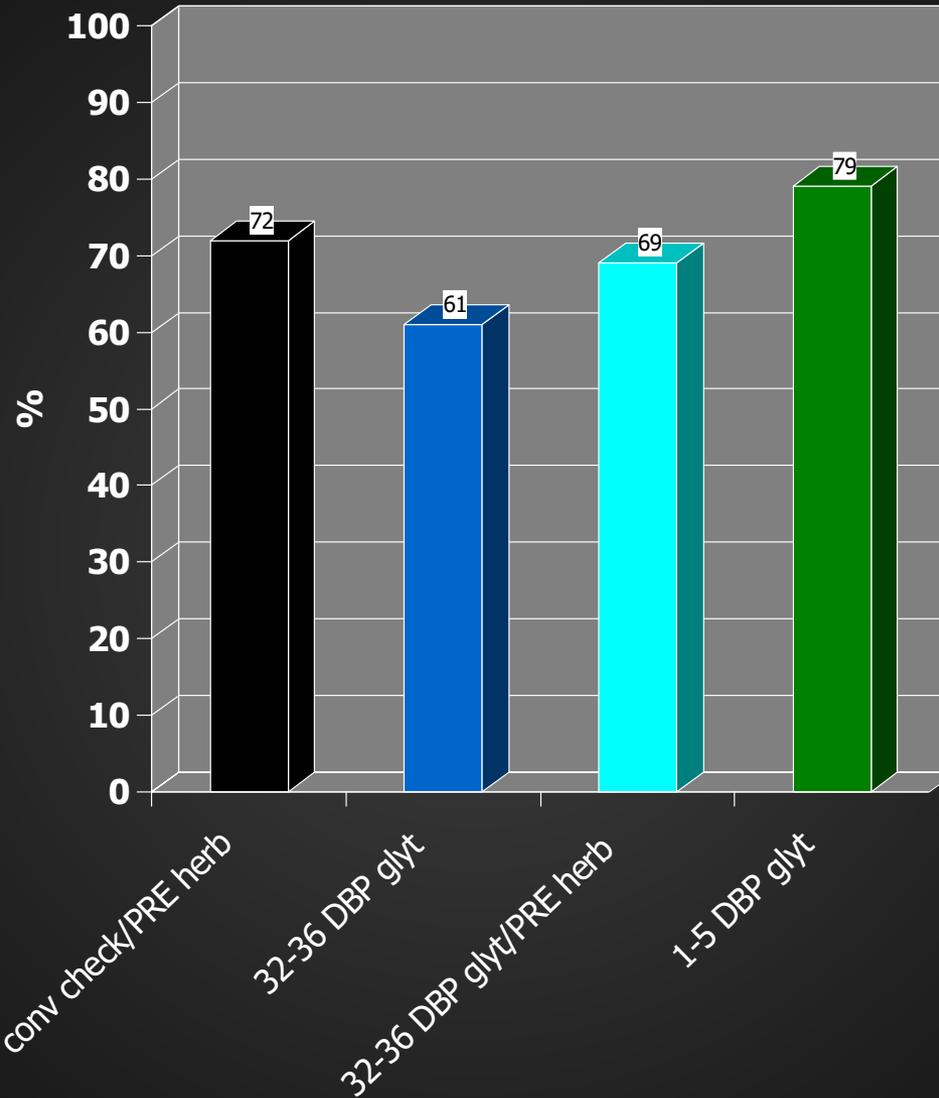
<sup>a</sup>Percentages do not total 100% because some respondents gave more than one reason.

# WINTER RYE COVER CROP FOR PINTO BEAN



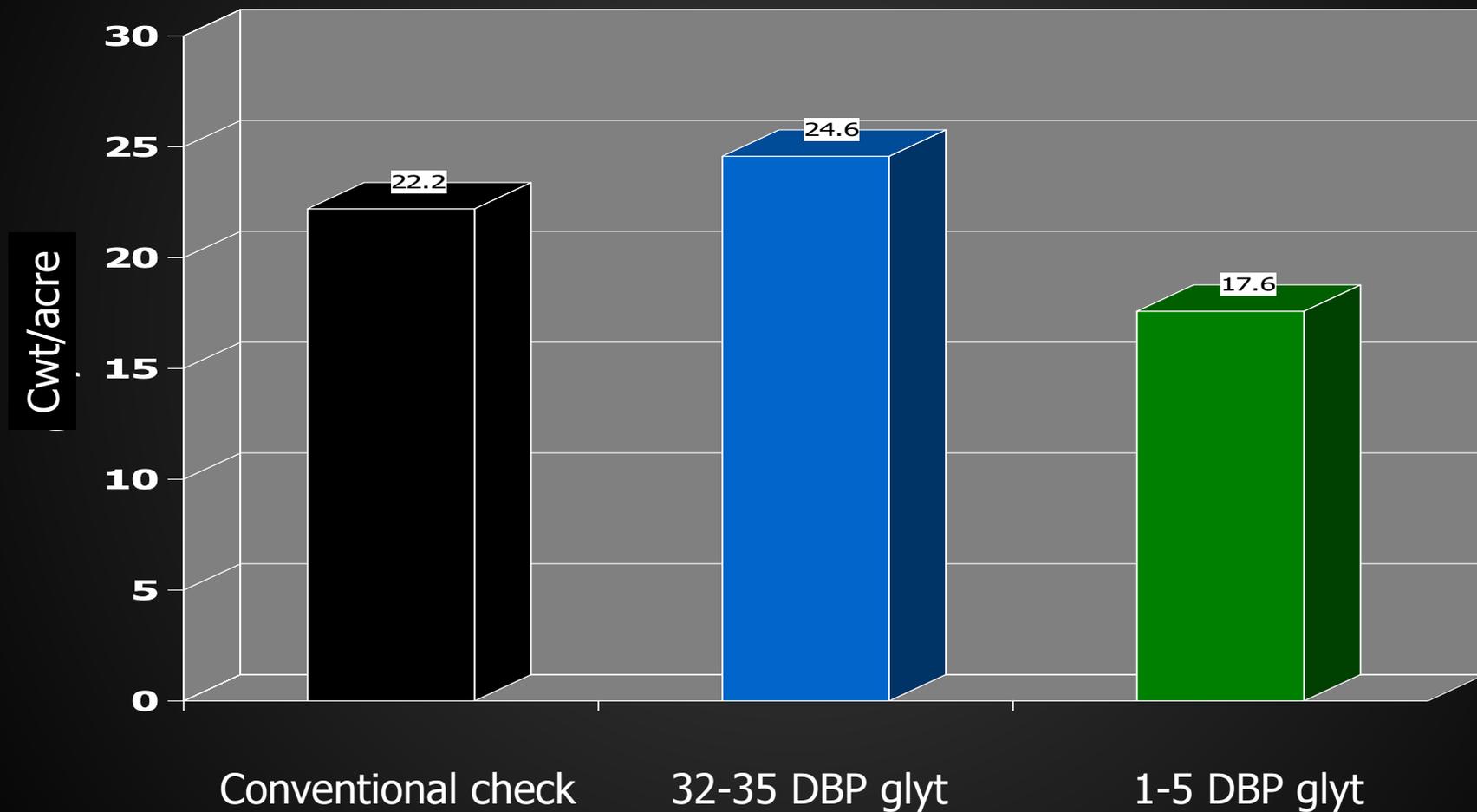
Bean yield?  
Rye termination timing?  
Weed suppression?

# **Grass weed control\* in pinto bean with conventional check (no rye), and several spring termination timings of rye, Carrington, 2018-19 (2 site-years)**



\*Primary weeds: foxtail. Visual evaluation prior to POST herbicide application across trial for general weed control.

## Pinto bean yield with conventional check, and early and late spring termination of rye, Carrington, 2017-19 (3 site-years)



# Rye cover crop/Pinto bean: Weed management notes, 2017-19

- Balance live rye period for benefits (including weed suppression) vs negative impact on dry bean (moisture stress)
- Rye density
  - ✓ 'high' = increased and extended (after rye termination) weed suppression
- Rye supplement to soil-applied herbicide
  - ✓ potentially a substitute
  - ✓ timely POST herbicide app
  - ✓ watch for tolerant weed species (e.g. legumes [black medic], lanceleaf sage)

# Ultra Blazer in Dry Beans?















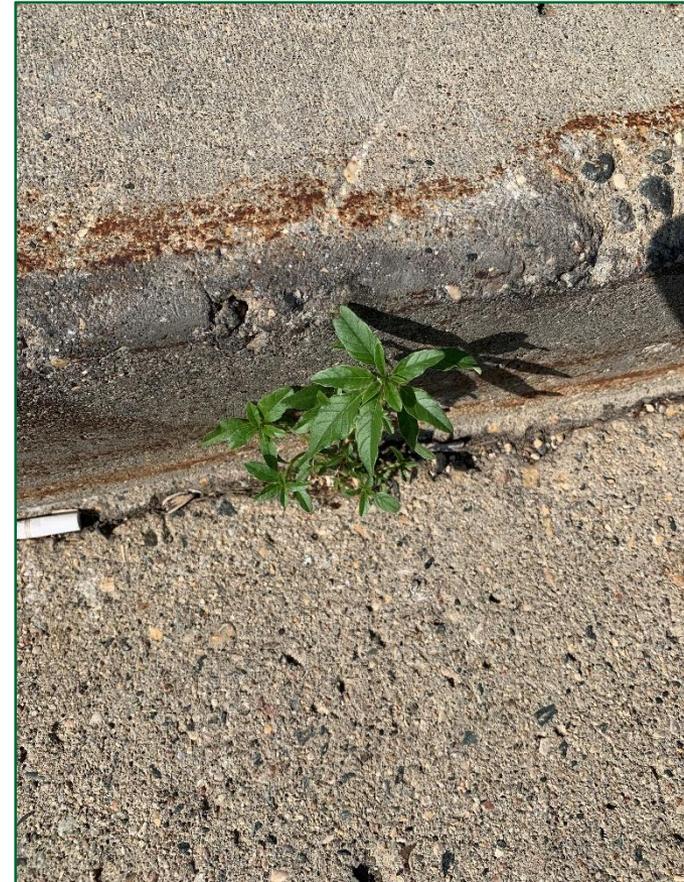
# Use Crop Rotation for Problem Weeds

**Table 28. Frequency of previous crops (2014 - 2017) in fields planted to dry bean in 2018.**

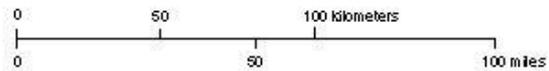
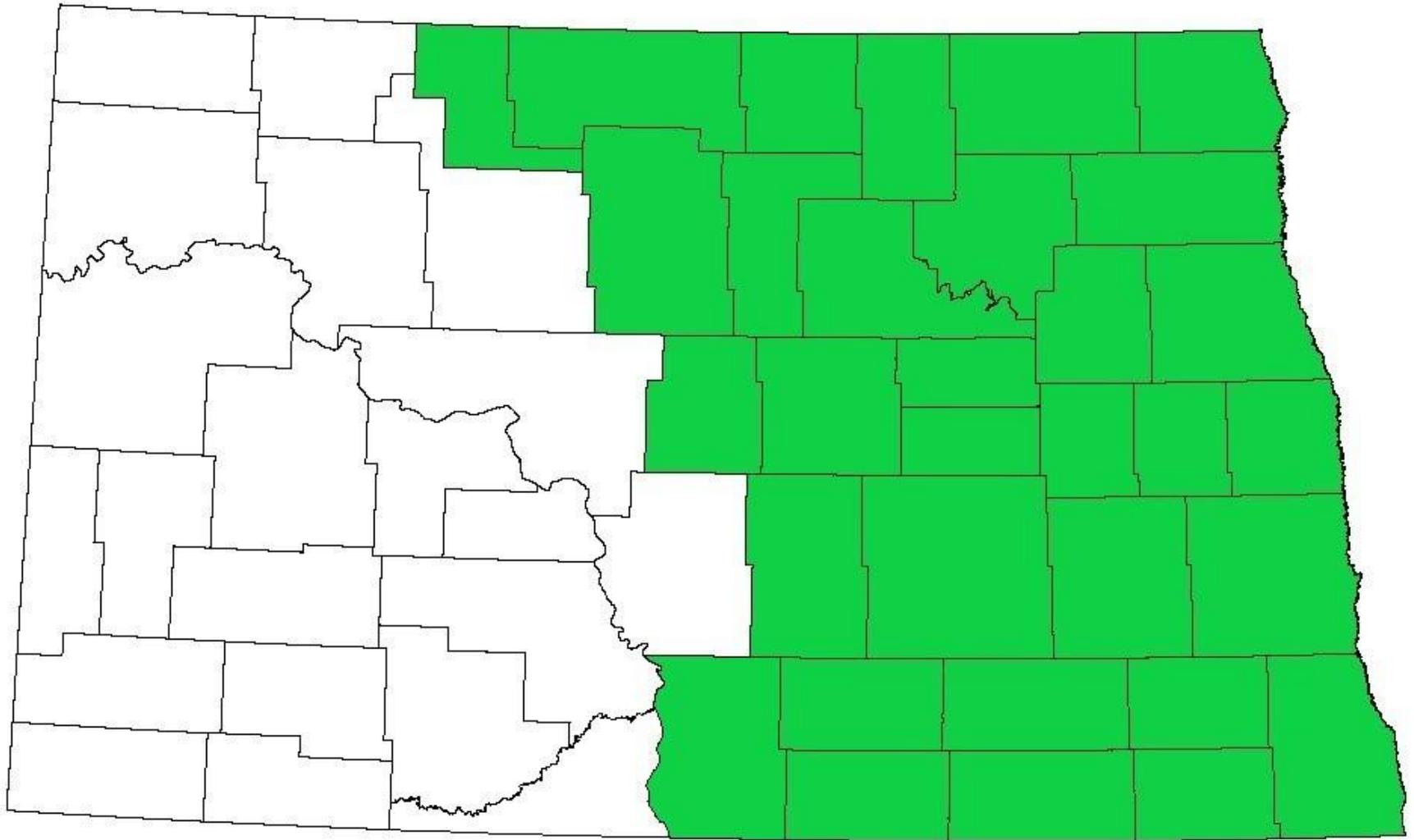
| Year                | 2017            | 2016            | 2015            | 2014            | 4-year average  |
|---------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Crop                | Respondents (%) |
| <b>Minnesota</b>    |                 |                 |                 |                 |                 |
| Alfalfa             | 1.1             | 1.1             | 1.2             | 1.2             | 1.1             |
| Barley              | 0               | 2.2             | 1.2             | 0               | 0.9             |
| Corn                | 68.9            | 33.3            | 55.8            | 40              | 49.6            |
| Dry bean            | 2.2             | 14.4            | 24.4            | 27.1            | 16.8            |
| Field pea           | 0               | 2.2             | 1.2             | 0               | 0.9             |
| Hay/Grass           | 2.2             | 0               | 1.2             | 0               | 0.9             |
| No crop             | 0               | 1.1             | 1.2             | 2.4             | 1.1             |
| Oats                | 0               | 1.1             | 0               | 0               | 0.3             |
| Potato              | 3.3             | 4.4             | 2.3             | 4.7             | 3.7             |
| Soybean             | 1.1             | 42.2            | 19.8            | 21.2            | 21.1            |
| Sugar beet          | 20              | 7.8             | 2.3             | 10.6            | 10.3            |
| Sunflower           | 0               | 1.1             | 0               | 0               | 0.3             |
| Wheat               | 18.9            | 12.2            | 9.3             | 7.1             | 12              |
| <b>North Dakota</b> |                 |                 |                 |                 |                 |
| Barley              | 7.8             | 2.2             | 4.6             | 3.9             | 4.6             |
| Canola              | 0               | 3.6             | 0               | 0.8             | 1.1             |
| Corn                | 40.4            | 10.1            | 35.9            | 16.4            | 25.8            |
| Dry bean            | 0.7             | 32.6            | 17.6            | 49.2            | 24.5            |
| Field pea           | 0               | 3.6             | 0               | 0.8             | 1.1             |
| Hay/Grass           | 0.7             | 0               | 1.5             | 0               | 0.6             |
| Potato              | 2.1             | 4.3             | 1.5             | 3.1             | 2.8             |
| Soybean             | 1.4             | 35.5            | 12.2            | 18.8            | 16.9            |
| Sugar beet          | 18.4            | 8.7             | 4.6             | 8.6             | 10.2            |
| Sunflower           | 0               | 4.3             | 0.8             | 0.8             | 1.5             |
| Wheat               | 61              | 26.1            | 51.9            | 25              | 41.3            |

# Waterhemp Issues in 2019

- Delayed planting (many skipped a PRE)
- Saturated fields
- Drowned out areas
- Prevent Plant



# NORTH DAKOTA



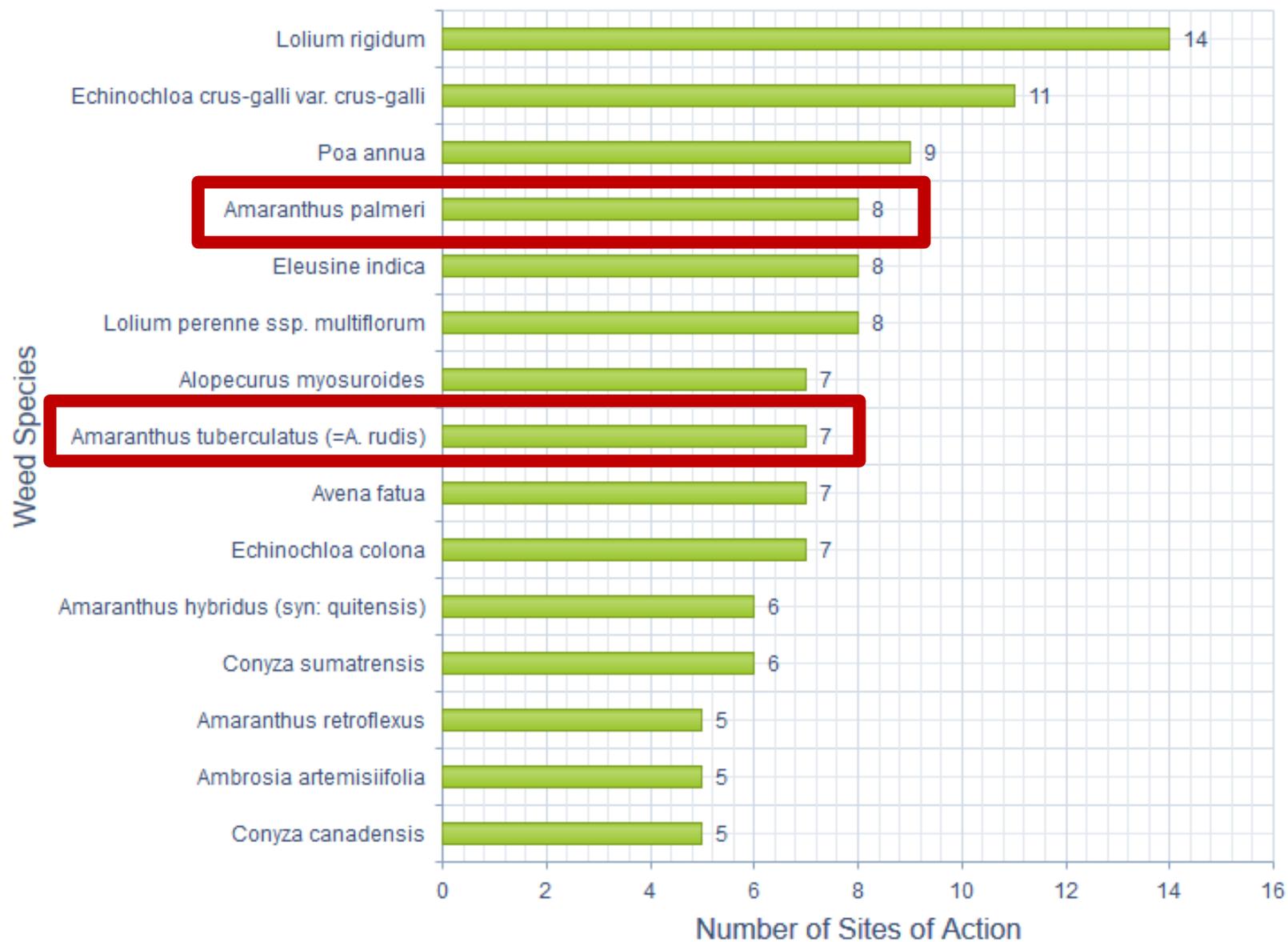
**Table 39. Worst weed problem in dry beans in 2018.**

| Weed <sup>a</sup>   | Respon-<br>dents (no.) | Respon-<br>dents (%) | Acres<br>reported (no.) <sup>b,c</sup> | Acres<br>reported (%) <sup>b,c</sup> |
|---------------------|------------------------|----------------------|----------------------------------------|--------------------------------------|
| <b>Minnesota</b>    |                        |                      |                                        |                                      |
| Lambsquarters       | 27                     | 29                   | 13,881                                 | 38.6                                 |
| <b>Waterhemp</b>    | <b>30</b>              | <b>32.3</b>          | <b>9,049</b>                           | <b>25.1</b>                          |
| Ragweed             | 16                     | 17.2                 | 4,279                                  | 11.9                                 |
| Redroot pigweed     | 3                      | 3.2                  | 3,585                                  | 10                                   |
| Nightshade          | 5                      | 5.4                  | 1,870                                  | 5.2                                  |
| Sunflower           | 1                      | 1.1                  | 595                                    | 1.7                                  |
| None                | 3                      | 3.2                  | 590                                    | 1.6                                  |
| Foxtail             | 2                      | 2.2                  | 541                                    | 1.5                                  |
| Cocklebur           | 1                      | 1.1                  | 511                                    | 1.4                                  |
| Wild oat            | 1                      | 1.1                  | 375                                    | 1                                    |
| Smartweed           | 1                      | 1.1                  | 373                                    | 1                                    |
| Volunteer grain     | 2                      | 2.2                  | 245                                    | 0.7                                  |
| Kochia              | 1                      | 1.1                  | 100                                    | 0.3                                  |
| <b>Total</b>        | <b>93</b>              | <b>100</b>           | <b>35,994</b>                          | <b>100</b>                           |
| <b>North Dakota</b> |                        |                      |                                        |                                      |
| Kochia              | 45                     | 31.5                 | 29,533                                 | 34.4                                 |
| Ragweed             | 18                     | 12.6                 | 12,451                                 | 14.5                                 |
| Redroot pigweed     | 17                     | 11.9                 | 9,896                                  | 11.5                                 |
| Lambsquarters       | 19                     | 13.3                 | 7,291                                  | 8.5                                  |
| Foxtail             | 3                      | 2.1                  | 7,230                                  | 8.4                                  |
| Nightshade          | 8                      | 5.6                  | 4,125                                  | 4.8                                  |
| Wild mustard        | 4                      | 2.8                  | 3,382                                  | 3.9                                  |
| <b>Waterhemp</b>    | <b>5</b>               | <b>3.5</b>           | <b>2,607</b>                           | <b>3</b>                             |
| Canada thistle      | 5                      | 3.5                  | 1,520                                  | 1.8                                  |
| None                | 2                      | 1.4                  | 1,276                                  | 1.5                                  |
| Marestail           | 2                      | 1.4                  | 1,128                                  | 1.3                                  |
| Wild buckwheat      | 3                      | 2.1                  | 1,045                                  | 1.2                                  |
| Lanceleaf sage      | 1                      | 0.7                  | 1,000                                  | 1.2                                  |
| Volunteer grain     | 2                      | 1.4                  | 855                                    | 1                                    |
| Cocklebur           | 3                      | 2.1                  | 767                                    | 0.9                                  |
| Wild oat            | 2                      | 1.4                  | 739                                    | 0.9                                  |
| Biennial wormwood   | 2                      | 1.4                  | 524                                    | 0.6                                  |
| Purslane            | 1                      | 0.7                  | 410                                    | 0.5                                  |
| Sunflower           | 1                      | 0.7                  | 100                                    | 0.1                                  |
| <b>Total</b>        | <b>143</b>             | <b>100</b>           | <b>85,879</b>                          | <b>100</b>                           |

**Table 40. Weeds ranked as one**

| Weed <sup>a</sup>   | Respon-<br>dents<br>(no.) | Respon-<br>dents<br>(%) | Acres<br>reported<br>(no.) <sup>b</sup> | Acres<br>reported<br>(%) <sup>b</sup> |
|---------------------|---------------------------|-------------------------|-----------------------------------------|---------------------------------------|
| <b>Minnesota</b>    |                           |                         |                                         |                                       |
| Lambsquarters       | 63                        | 67.7                    | 24,854                                  | 69.1                                  |
| Ragweed             | 46                        | 49.5                    | 19,406                                  | 53.9                                  |
| Waterhemp           | 43                        | 46.2                    | 18,126                                  | 50.4                                  |
| Redroot             |                           |                         |                                         |                                       |
| pigweed             | 23                        | 24.7                    | 9,945                                   | 27.6                                  |
| Nightshade          | 22                        | 23.7                    | 7,133                                   | 19.8                                  |
| Cocklebur           | 8                         | 8.6                     | 3,016                                   | 8.4                                   |
| Wild buckwheat      | 2                         | 2.2                     | 2,620                                   | 7.3                                   |
| Volunteer grain     | 9                         | 9.7                     | 2,386                                   | 6.6                                   |
| Canada thistle      | 7                         | 7.5                     | 2,145                                   | 6                                     |
| Smartweed           | 6                         | 6.5                     | 1,888                                   | 5.2                                   |
| Biennial            |                           |                         |                                         |                                       |
| wormwood            | 2                         | 2.2                     | 1,800                                   | 5                                     |
| Kochia              | 4                         | 4.3                     | 1,688                                   | 4.7                                   |
| Foxtail             | 6                         | 6.5                     | 1,645                                   | 4.6                                   |
| Sunflower           | 2                         | 2.2                     | 725                                     | 2                                     |
| None                | 3                         | 3.2                     | 590                                     | 1.6                                   |
| Wild oat            | 1                         | 1.1                     | 375                                     | 1                                     |
| Lanceleaf sage      | 1                         | 1.1                     | 160                                     | 0.4                                   |
| Wild mustard        | 1                         | 1.1                     | 160                                     | 0.4                                   |
| Venice mallow       | 1                         | 1.1                     | 112                                     | 0.3                                   |
| <b>North Dakota</b> |                           |                         |                                         |                                       |
| Kochia              | 82                        | 57.3                    | 51,222                                  | 59.6                                  |
| Lambsquarters       | 59                        | 41.3                    | 33,422                                  | 38.9                                  |
| Redroot             |                           |                         |                                         |                                       |
| pigweed             | 51                        | 35.7                    | 28,242                                  | 32.9                                  |
| Ragweed             | 42                        | 29.4                    | 26,973                                  | 31.4                                  |
| Foxtail             | 13                        | 9.1                     | 15,306                                  | 17.8                                  |
| Nightshade          | 22                        | 15.4                    | 14,815                                  | 17.3                                  |
| Wild mustard        | 23                        | 16.1                    | 12,564                                  | 14.6                                  |
| Volunteer grain     | 17                        | 11.9                    | 11,372                                  | 13.2                                  |
| Cocklebur           | 18                        | 12.6                    | 8,079                                   | 9.4                                   |
| Canada thistle      | 19                        | 13.3                    | 7,713                                   | 9                                     |
| Waterhemp           | 11                        | 7.7                     | 6,944                                   | 8.1                                   |
| Wild oat            | 13                        | 9.1                     | 6,510                                   | 7.6                                   |
| Wild buckwheat      | 12                        | 8.4                     | 6,248                                   | 7.3                                   |
| Marestail           | 3                         | 2.1                     | 4,228                                   | 4.9                                   |
| Biennial            |                           |                         |                                         |                                       |
| wormwood            | 10                        | 7                       | 3,973                                   | 4.6                                   |
| Smartweed           | 2                         | 1.4                     | 1,316                                   | 1.5                                   |

## Resistant Species by # of Sites of Action (Top 15)

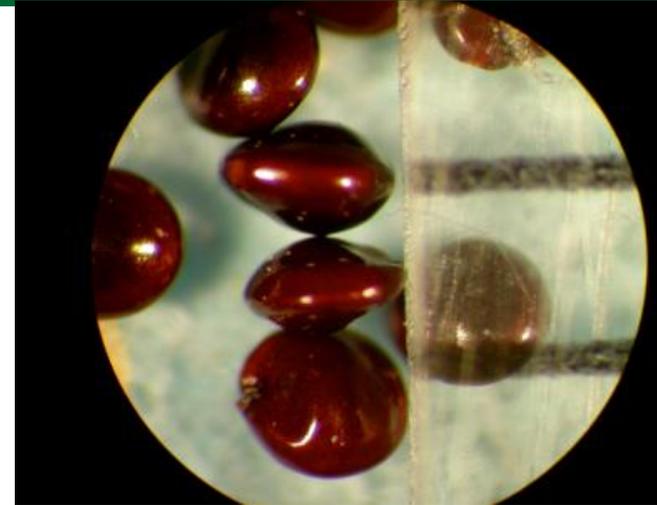


©2019 WeedScience.org, Dr. Ian Heap 12/03/2019

# Waterhemp Biology

## Seed:

- Prolific seed production
- Long emergence period
- Small seed size



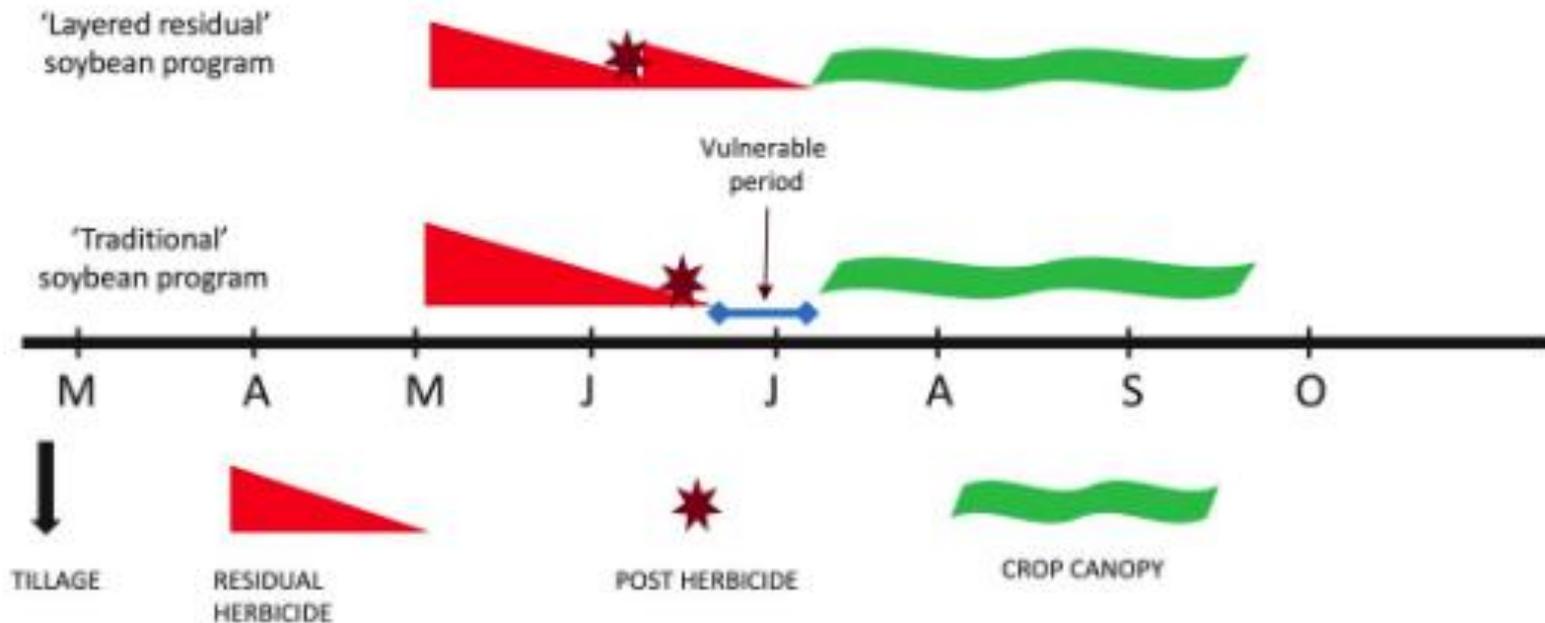
## Biology:

- Rapid growth during ideal conditions
- Dioecious reproductive: Obligate out crosser

# Why should I use layered residuals for Waterhemp control in soybean?

## Layered Residual Herbicides

Objective: Prolong PRE activity until canopy fills



# Waterhemp Control in Soybeans

(assuming it is glyphosate and ALS resistant but not PPO resistant)

- Start clean and use residuals at planting
  - Sulfentrazone (Authority), flumioxazin (Valor), pyroxasulfone (Zidua)
  - Metribuzin (at least 6 oz), metolachlor (Dual), acetochlor (Warrant), dimethenamid (Outlook), anything yellow
- **TIMELY** post treatments + another layer of residual
  - Flexstar/Cobra/Blazer + metolachlor, acetochlor, dimethenamid, or pyroxasulfone
  - Or
  - Liberty + metolachlor, acetochlor, dimethenamid, or pyroxasulfone in LL soybean
  - Or
  - Xtendimax/Engenia + approved group 15 in RR2Xtend soybean
  - Or
  - Enlist (tank-mix with Liberty) + approved group 15 in Enlist soybean



Untreated Check

ZIDUA PRO 4.09 SC  
6 fl oz/a  
ROUNDUP POWERMAX 4.5 SL  
32 fl oz/a  
MSO ULTRA 100 L  
1 % v/v  
N-PAK - AMS 3.4 L  
2.5 % v/v  
7 DAYS PREPLANT

ROUNDUP POWERMAX 4.5 SL  
32 fl oz/a  
ENGENIA 5 SL  
12.8 fl oz/a  
MID POST



ZIDUA PRO 4.09 SC  
6 fl oz/a  
ROUNDUP POWERMAX 4.5 SL  
32 fl oz/a  
MSO ULTRA 100 L  
1 % v/v  
N-PAK - AMS 3.4 L  
2.5 % v/v  
7 DAYS PREPLANT

ENGENIA 5 SL  
12.8 fl oz/a  
ROUNDUP POWERMAX 4.5 SL  
32 fl oz/a  
OUTLOOK 6 EC  
10 fl oz/a  
MID POST

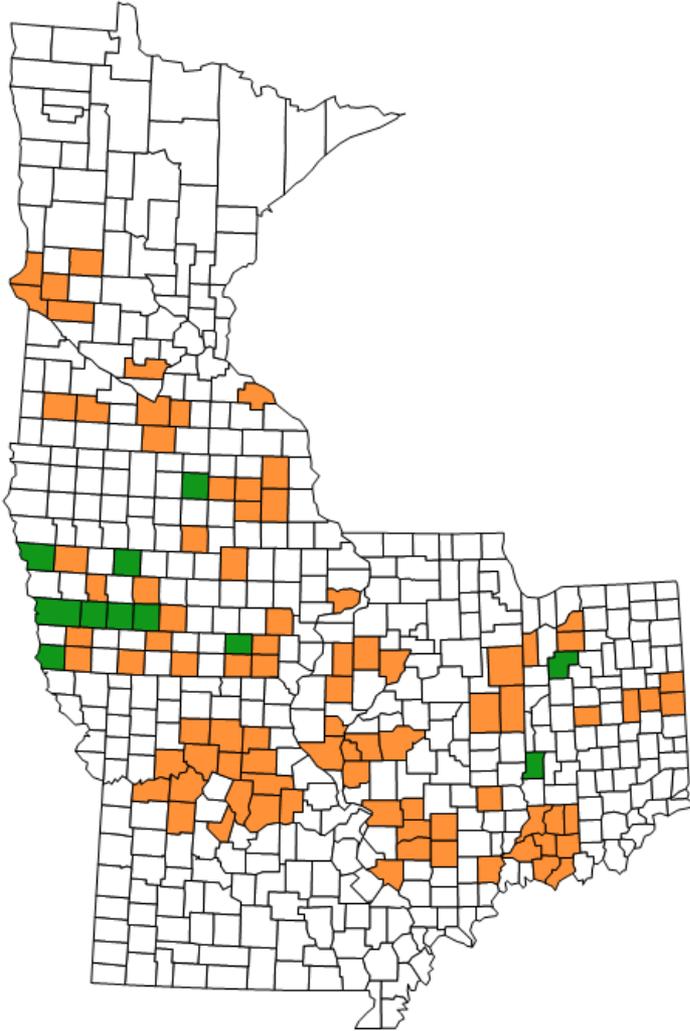
14 15

# Waterhemp Control in Dry Beans

(assuming it is glyphosate and ALS resistant but not PPO resistant)

- Start clean and use residuals at planting
  - Sulfentrazone (Spartan)
  - Metolachlor (Dual), dimethenamid (Outlook), anything yellow
- **TIMELY** post treatments + another layer of residual
  - Reflex + dimethenamid (Outlook)
  - Blazer?

# Waterhemp Populations with Group #14 Resistance



| Resistant         |             |               |
|-------------------|-------------|---------------|
| Total             | Whole Plant | $\Delta G210$ |
| Populations (no.) |             |               |
| 148               | 126         | 125           |

■  $\Delta G210$  present

■  $\Delta G210$  absent

84%

# Waterhemp Control in Dry Beans

(assuming it is glyphosate and ALS resistant AND PPO resistant)

- Start clean and use residuals at planting
  - Sulfentrazone (Spartan)
  - Metolachlor (Dual), dimethenamid (Outlook), anything yellow
- **TIMELY** post treatments + another layer of residual
  - ~~Reflex~~ + dimethenamid (Outlook)
  - ~~Blazer?~~

# Use Crop Rotation for Problem Weeds

**Table 28. Frequency of previous crops (2014 - 2017) in fields planted to dry bean in 2018.**

| Year                | 2017            | 2016            | 2015            | 2014            | 4-year average  |
|---------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Crop                | Respondents (%) |
| <b>Minnesota</b>    |                 |                 |                 |                 |                 |
| Alfalfa             | 1.1             | 1.1             | 1.2             | 1.2             | 1.1             |
| Barley              | 0               | 2.2             | 1.2             | 0               | 0.9             |
| Corn                | 68.9            | 33.3            | 55.8            | 40              | 49.6            |
| Dry bean            | 2.2             | 14.4            | 24.4            | 27.1            | 16.8            |
| Field pea           | 0               | 2.2             | 1.2             | 0               | 0.9             |
| Hay/Grass           | 2.2             | 0               | 1.2             | 0               | 0.9             |
| No crop             | 0               | 1.1             | 1.2             | 2.4             | 1.1             |
| Oats                | 0               | 1.1             | 0               | 0               | 0.3             |
| Potato              | 3.3             | 4.4             | 2.3             | 4.7             | 3.7             |
| Soybean             | 1.1             | 42.2            | 19.8            | 21.2            | 21.1            |
| Sugar beet          | 20              | 7.8             | 2.3             | 10.6            | 10.3            |
| Sunflower           | 0               | 1.1             | 0               | 0               | 0.3             |
| Wheat               | 18.9            | 12.2            | 9.3             | 7.1             | 12              |
| <b>North Dakota</b> |                 |                 |                 |                 |                 |
| Barley              | 7.8             | 2.2             | 4.6             | 3.9             | 4.6             |
| Canola              | 0               | 3.6             | 0               | 0.8             | 1.1             |
| Corn                | 40.4            | 10.1            | 35.9            | 16.4            | 25.8            |
| Dry bean            | 0.7             | 32.6            | 17.6            | 49.2            | 24.5            |
| Field pea           | 0               | 3.6             | 0               | 0.8             | 1.1             |
| Hay/Grass           | 0.7             | 0               | 1.5             | 0               | 0.6             |
| Potato              | 2.1             | 4.3             | 1.5             | 3.1             | 2.8             |
| Soybean             | 1.4             | 35.5            | 12.2            | 18.8            | 16.9            |
| Sugar beet          | 18.4            | 8.7             | 4.6             | 8.6             | 10.2            |
| Sunflower           | 0               | 4.3             | 0.8             | 0.8             | 1.5             |
| Wheat               | 61              | 26.1            | 51.9            | 25              | 41.3            |

# How Long Do Pigweed Seed Live??

## Palmer amaranth

- Soil Surface
  - 12 months – 15%
  - 24 months – 5-10%
  - 36 months – ~5%
- 6-inches deep
  - 12 months – 20%
  - 24 months – 10%
  - 36 months – 5-10%
- 4 years in a freezer
  - 91 – 95 %

## Waterhemp

- Soil Surface
  - 12 months – 15%
  - 24 months – 5-10%
  - 36 months – 5%
- 6-inches deep
  - 12 months – 22%
  - 24 months – 10-15%
  - 36 months – 5%
- 4 years in a freezer
  - 91 – 94 %

# When Weeds Actually Help Dry Beans!





**Questions?**















