Weed Management

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Outline

1) Weed science research at USU
2) Weed identification
3) Herbicide resistant kochia populations
4) Wild oat control in small grains

Weed Science at USU

Mirella Ortiz

65% Research, 30 Teaching

Aquatic Weeds

Herbicide Absorption, translocation, metabolism

Eric Westra

100% Research

Agronomic weeds

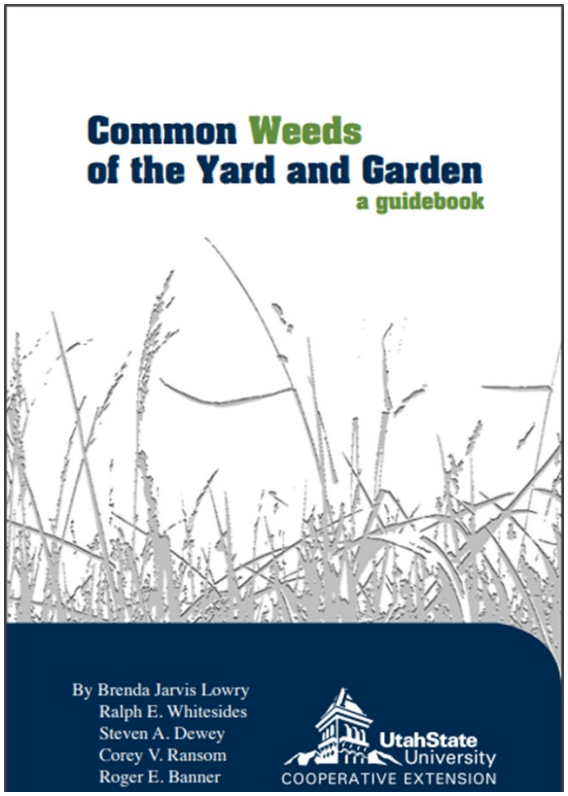
Herbicide resistance traits in wheat, general weed control, resistant kochia

What Do We Do?

Conduct research to address weed management needs and concerns in Utah and the Western US.

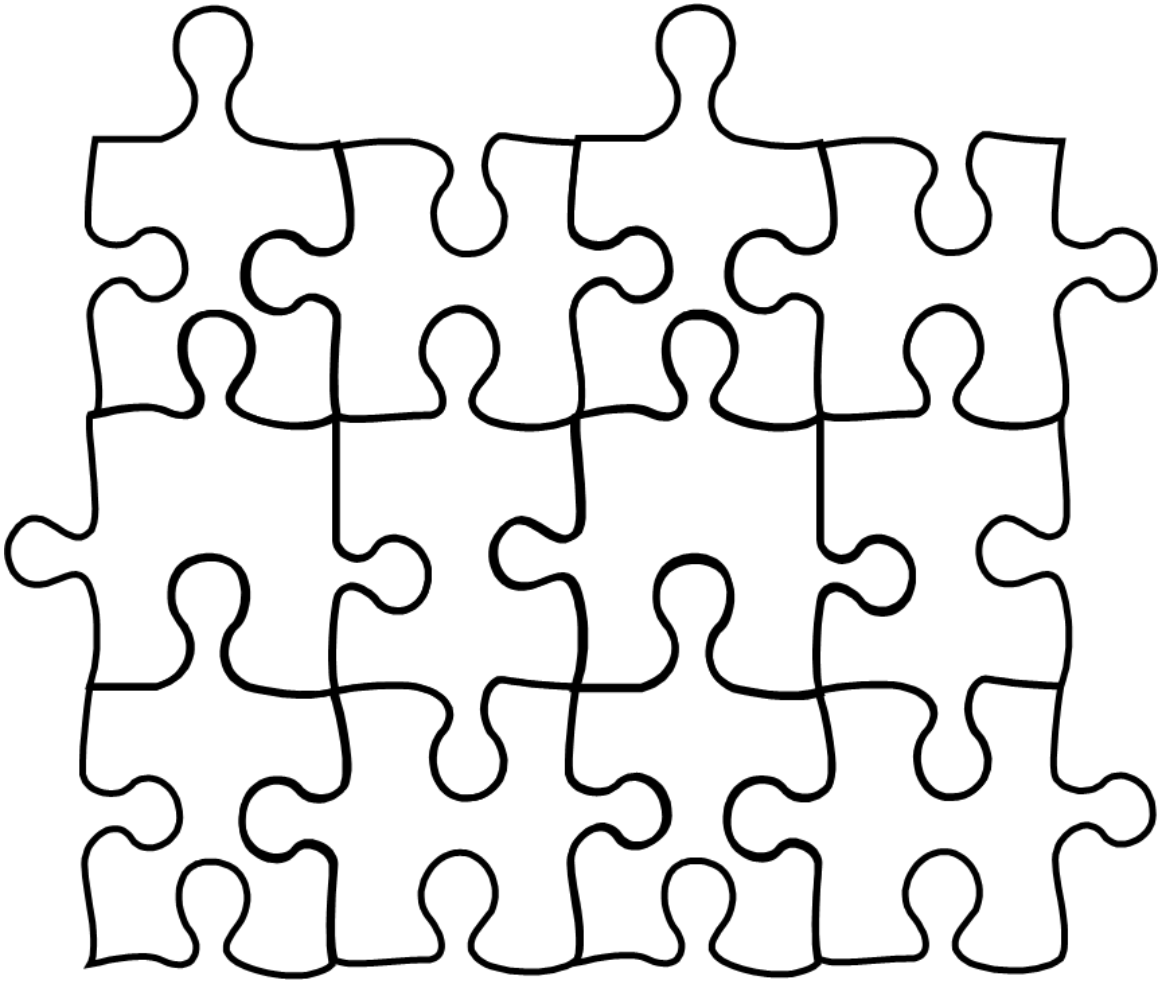
Extend information to agricultural producers and land managers to improve weed management.

Consult when problem arise.



Weed Science is Like Solving a Puzzle

- What is the problem?
- What do we already know and what information is missing?
- How can we combine knowledge to identify solutions?



Approaching the Problem

Weed Biology/Ecology

- seed viability, dispersal, dormancy, and germination.
- reproduction, competition, and impact.
- response to environmental factors.

Management Options

- control with herbicides
- response to other management
- new technology

Looking for an Integrated Approach

The use of multiple strategies for weed management.

Strategies include:

1. Prevention
2. Cultural
3. Physical/Mechanical
4. Biological
5. Chemical

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Correct Plant ID is Important!

- "Know thy enemy and know yourself; in a hundred battles, you will never be defeated."
- Can influence management options
  - Understanding lifecycle
  - Identifying effective herbicide options
  - Reducing potential for animal injury or poisoning
  - May help identify underlying field conditions

Morningglory or Field Bindweed?

Correct Plant ID is Important!

Table 7. Weeds Controlled by Residual Activity of *Chateau* Herbicide SW (continued)

BROADLEAF WEED SPECIES				
COMMON NAME	**SCIENTIFIC NAME**	**ORGANIC MATTER**	**SOIL TYPE**	***CHATEAU* HERBICIDE SW RATE**
Kochia	*Kochia scoparia*	Up to 5%	All Soil Types	4 oz/A
Lambsquarters, Common	*Chenopodium album*			
Little Mallow	*Malva parviflora*			
Marestail/Horseweed	*Conyza canadensis*			
Morningglories				
Entireleaf	*Ipomoea hederacea* var. *integriuscula*			
Ivyleaf	*Ipomoea hederacea*			
Red/Scarlet	*Ipomoea coccinea*			
Smallflower	*Jacquemontia tamnifolia*			
Tall	*Ipomoea purpurea*			
Mustard, Wild	*Brassica kaber*			
Nightshades				
Black	*Solanum nigrum*			
Eastern Black	*Solanum ptycanthum*			
Hairy	*Solanum sarrachoides*			

(continued)

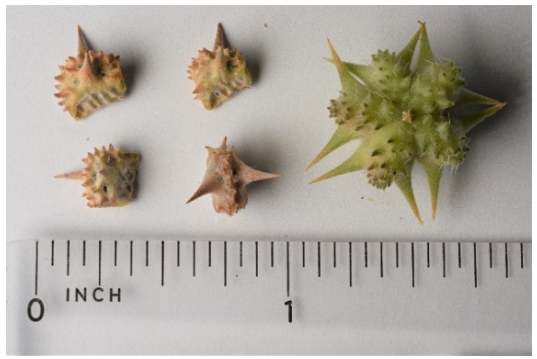
What Characteristics are Important?

Physical traits

- Leaves, stems, roots, reproductive structures, flowers, seeds, etc.
- Growth habit and size
- Hairs, spines, smell, color, sap

Lifecycle

Habitat



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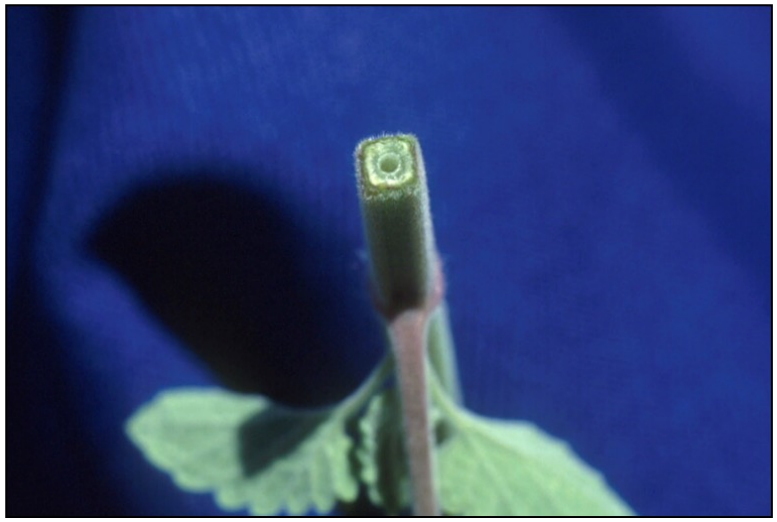
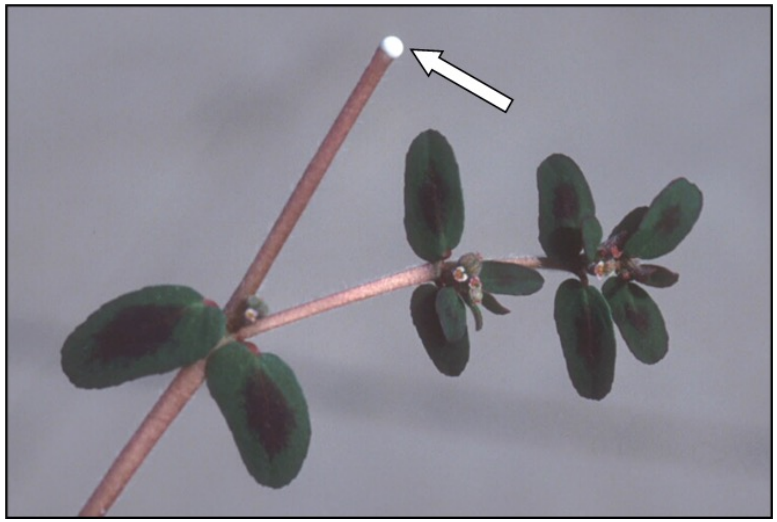
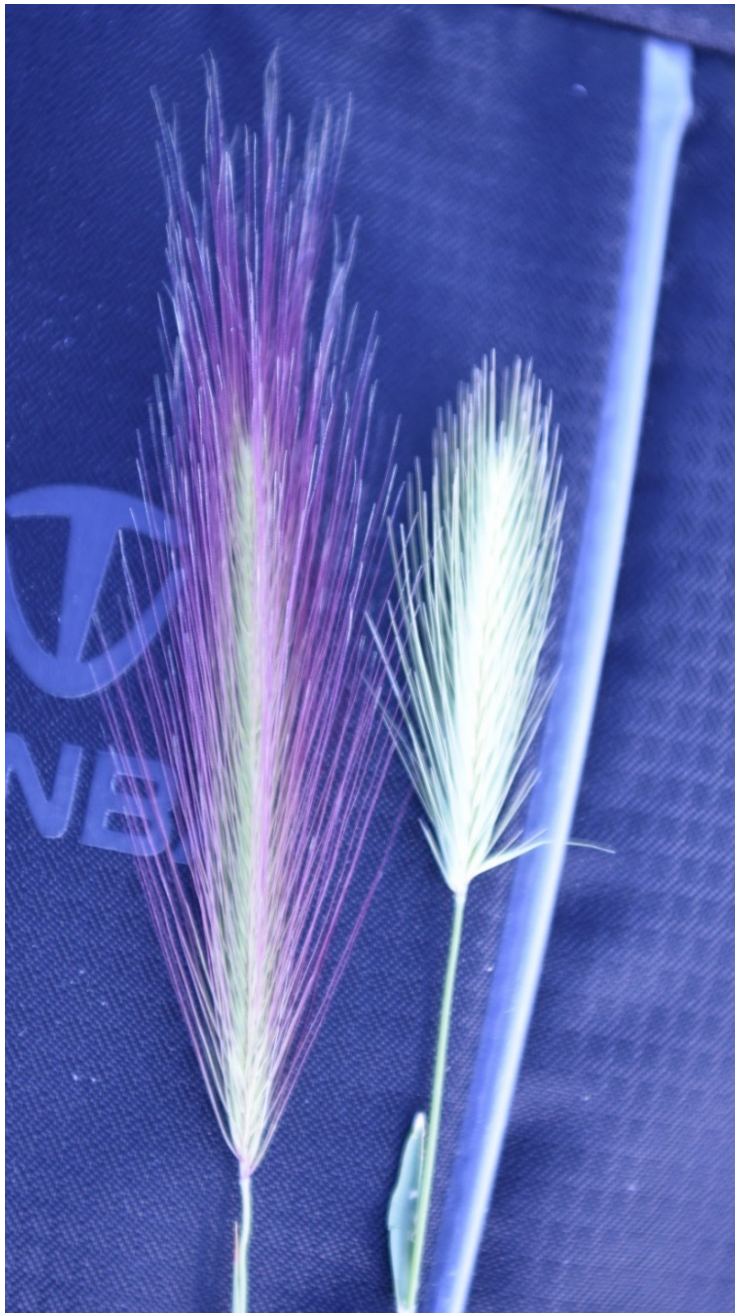
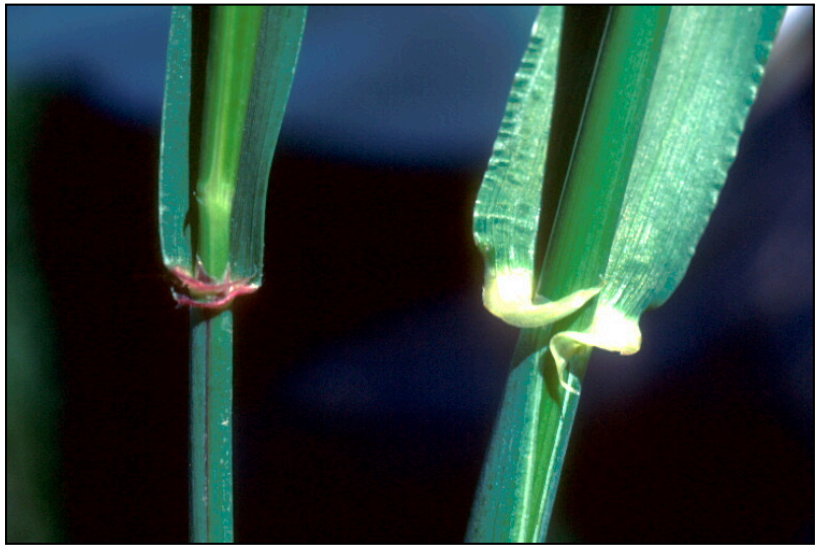





NBA





Wheat **Barley**

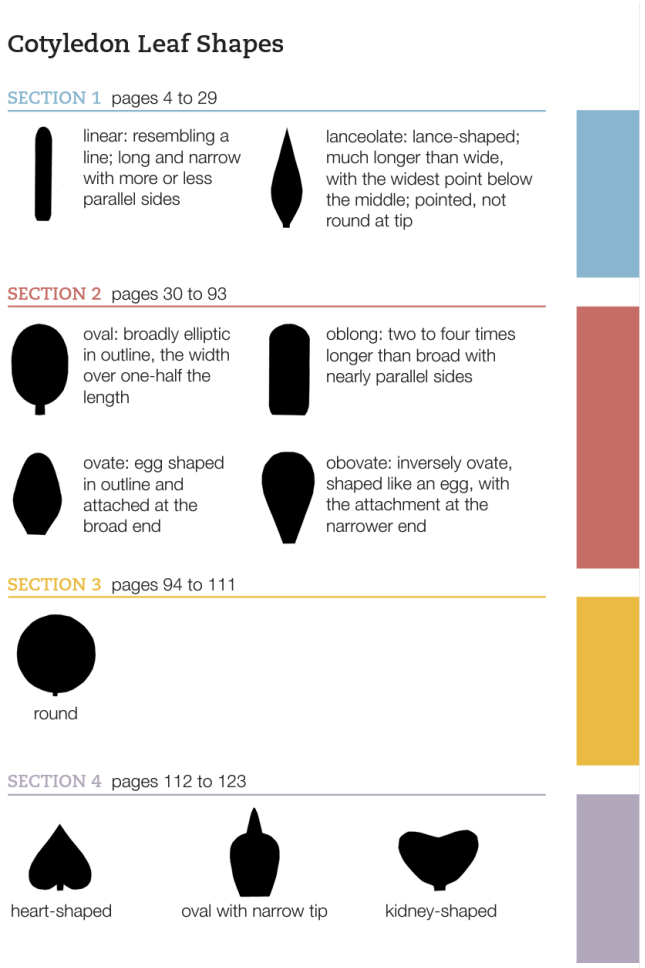
Green Foxtail

Downy Brome

Barnyardgrass

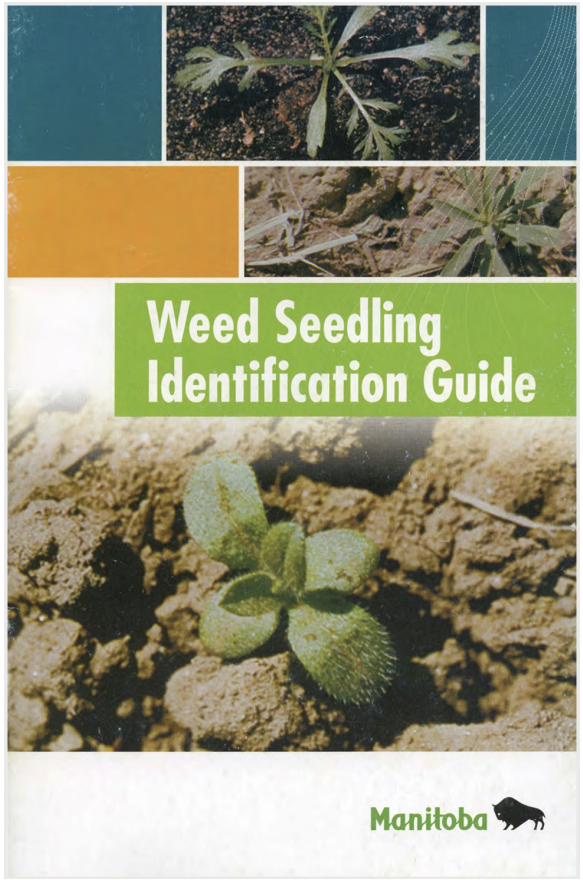
What About Weed Seedlings

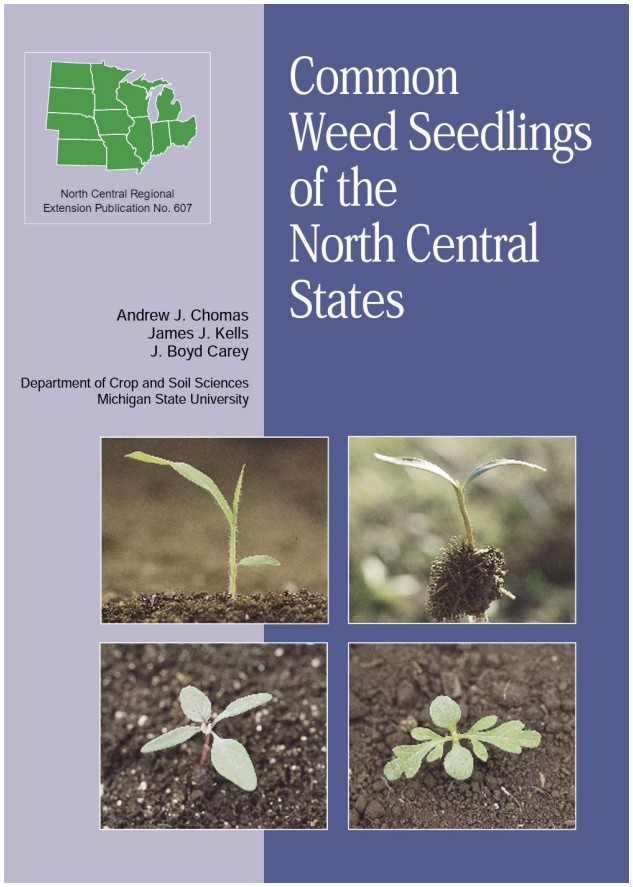
- Obviously fewer traits to evaluate
- Focus on cotyledons and first leaves
- Looks for attached seeds
- Look for existing mature plants or remnants
- What weeds were there last year?
- See what develops from unknown seedlings

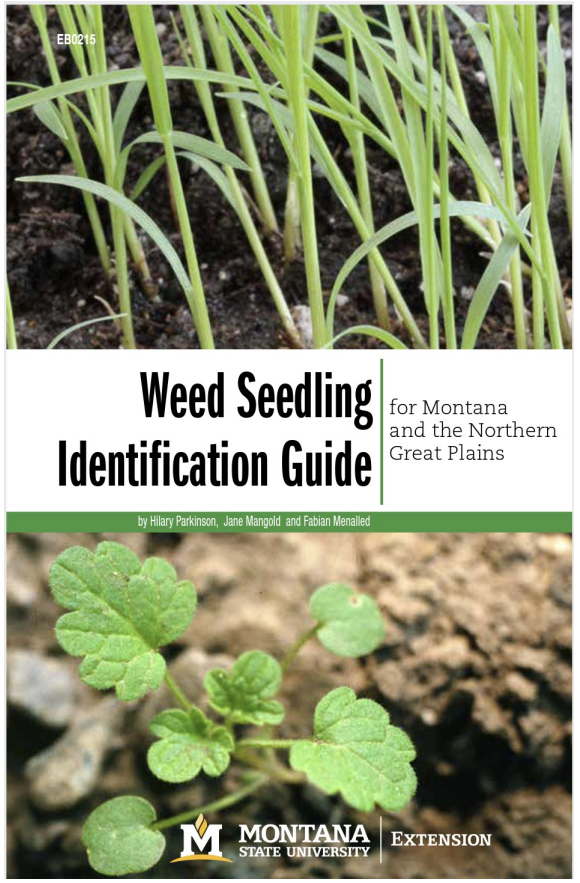


Mangold and Menalled, MSU Extension

Weed Seedling Identification Guides







Good Pictures are Key to Plant Identification

- Overview picture
- Plant parts, root, stem, leaves, flowers, fruit, seed
- Close-up (hairs, spots, collar region of grasses)
- Phone images through hand-lens

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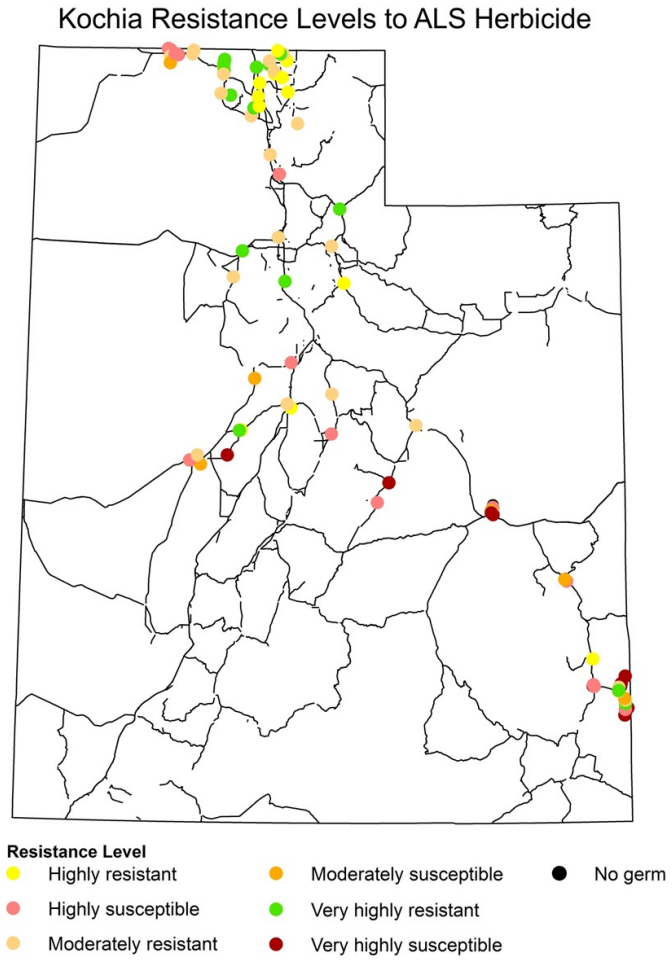
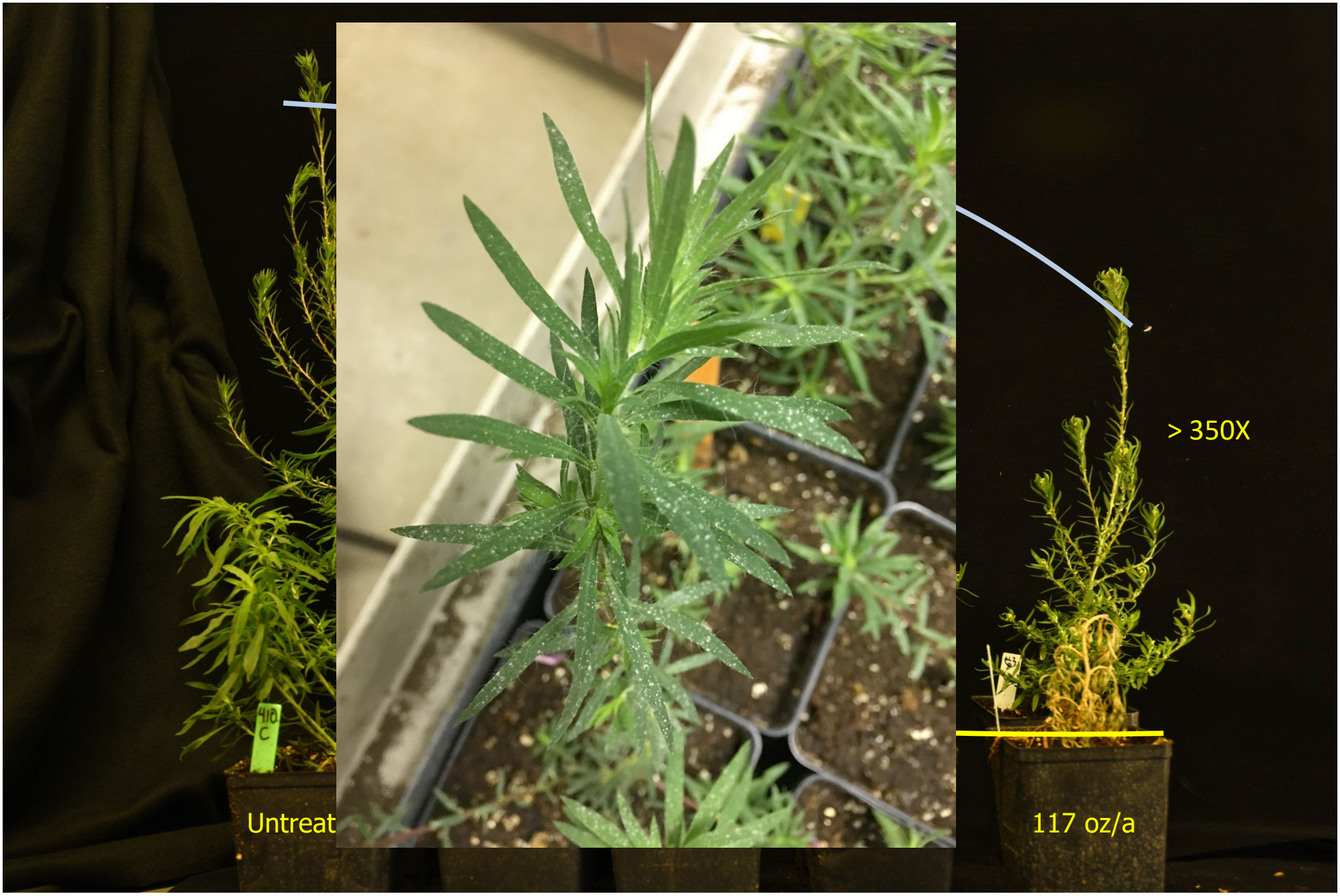
Herbicide Resistance in Kochia

- Out of 85 collection statewide:
- Chlorsulfuron Resistance
  - 15 Very Highly Resistant
  - 14 Highly Resistant
  - 23 Moderately Resistant
  - 61%
- Dicamba Resistance
  - 2 Very Highly Resistant
  - 3 High Resistance
  - 6 Moderately Resistant
- Several population were very highly or highly resistant to both chemistries (Multiple Resistance)

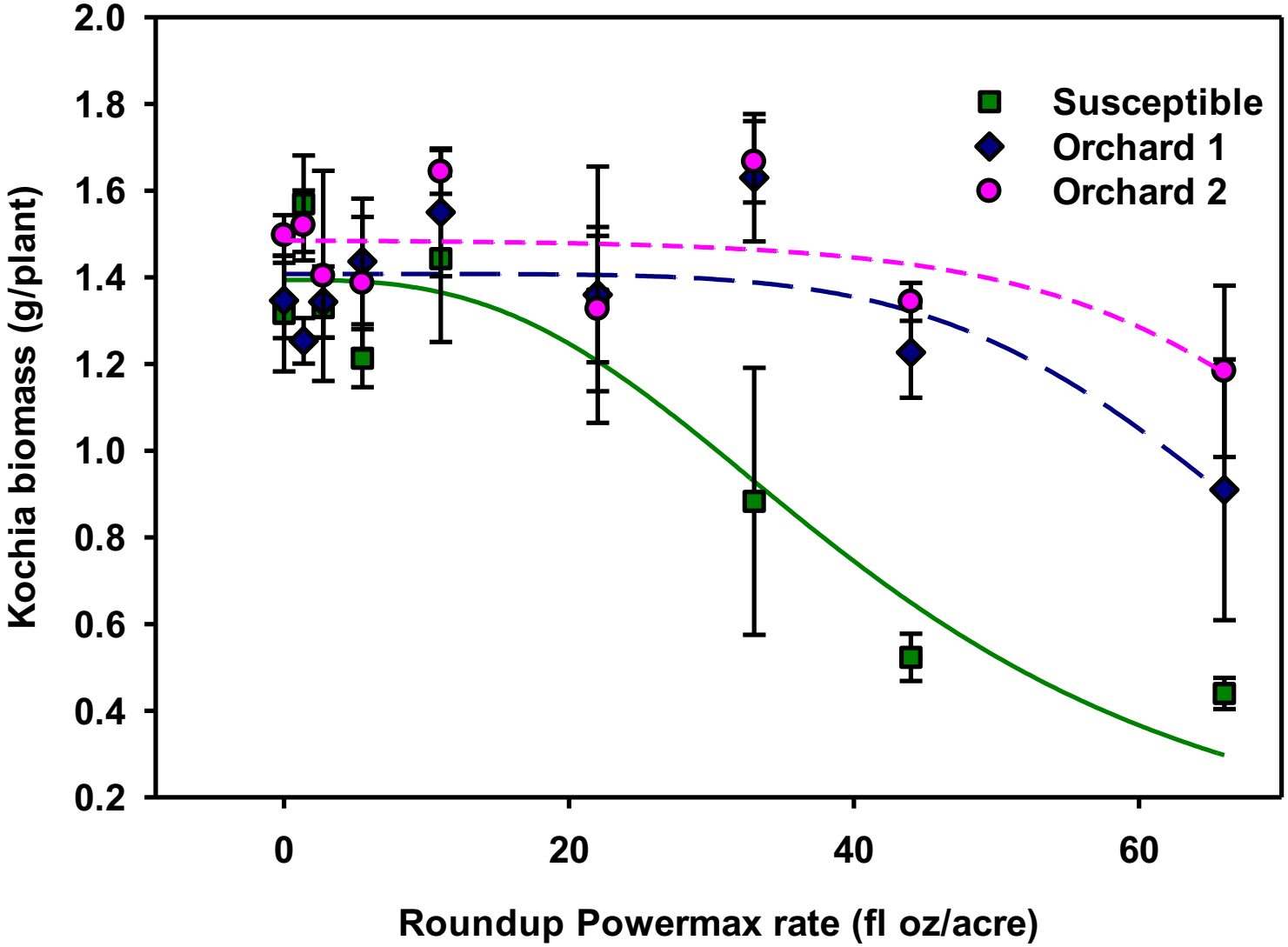



> 350X
Untreat
117 oz/a

From uncontrolled plant in an orchard

Known susceptible

Kochia Response to Roundup



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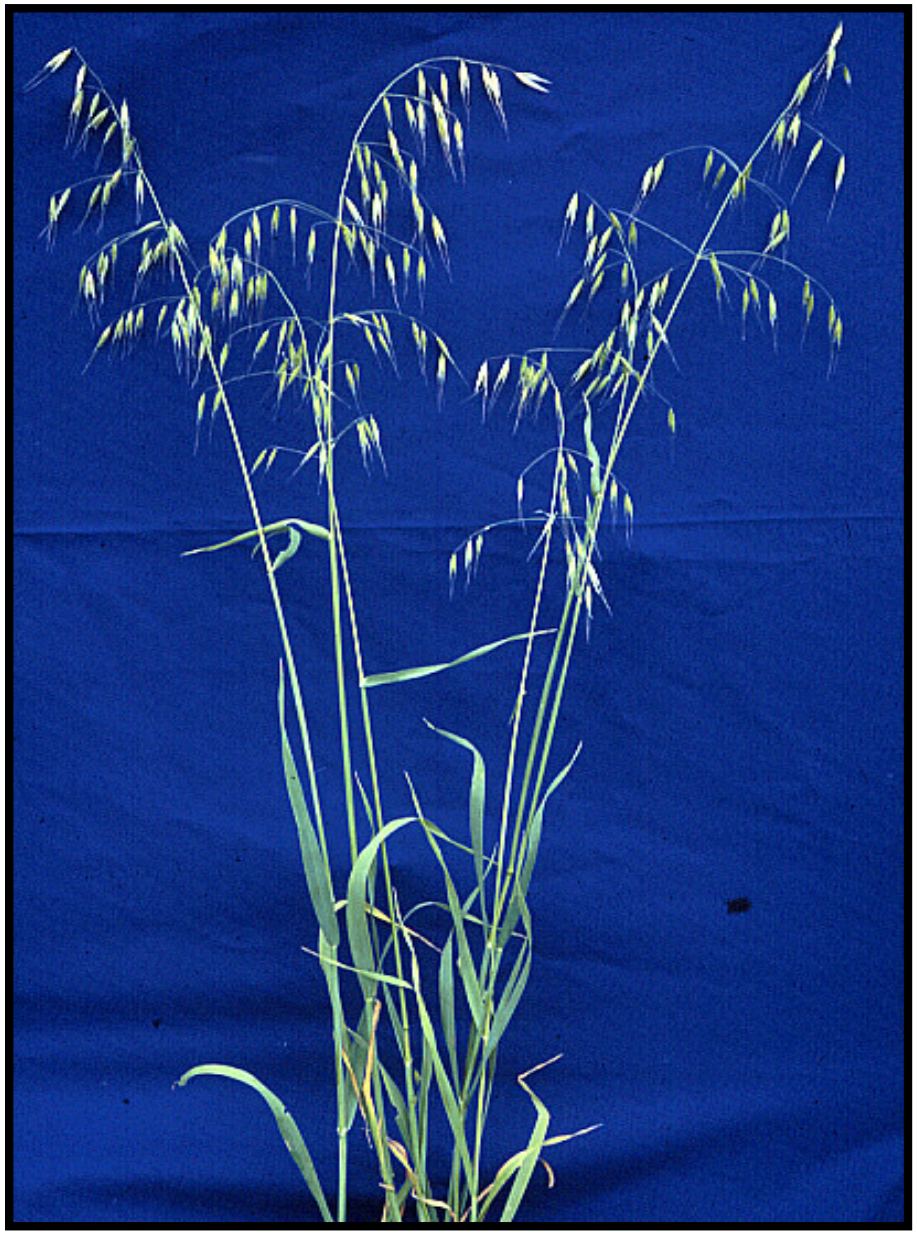
Wild oat control in small grains

Application dates:

- Jun-4-2016
- Jun-23-2017
- May-14-2019
- May-15-2020
- May-23-2022



Wild Oat Impacts

Yield losses/dockage

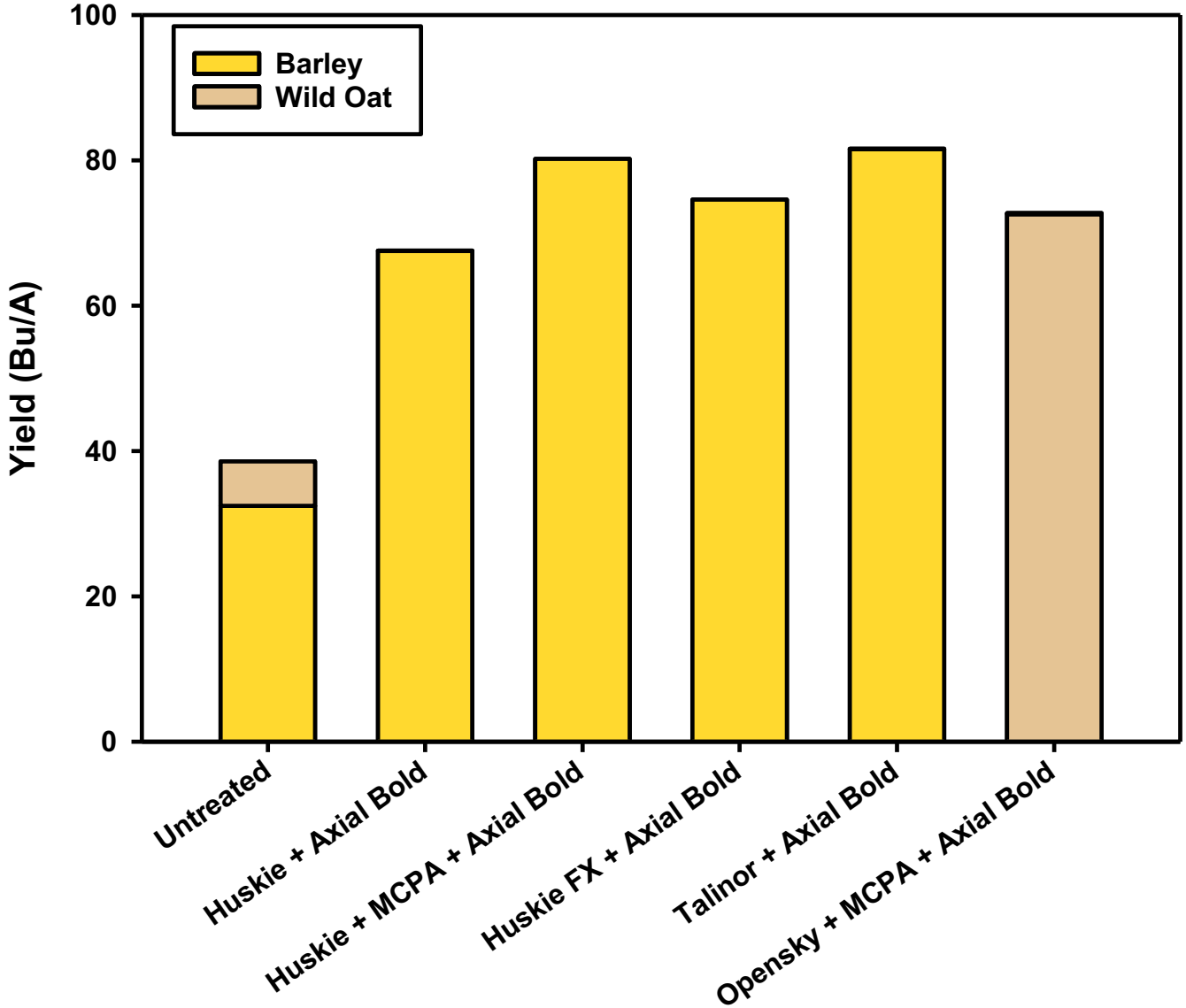
Impact of increasing seedbank to other crops

Increased consumption of fertilizer and water

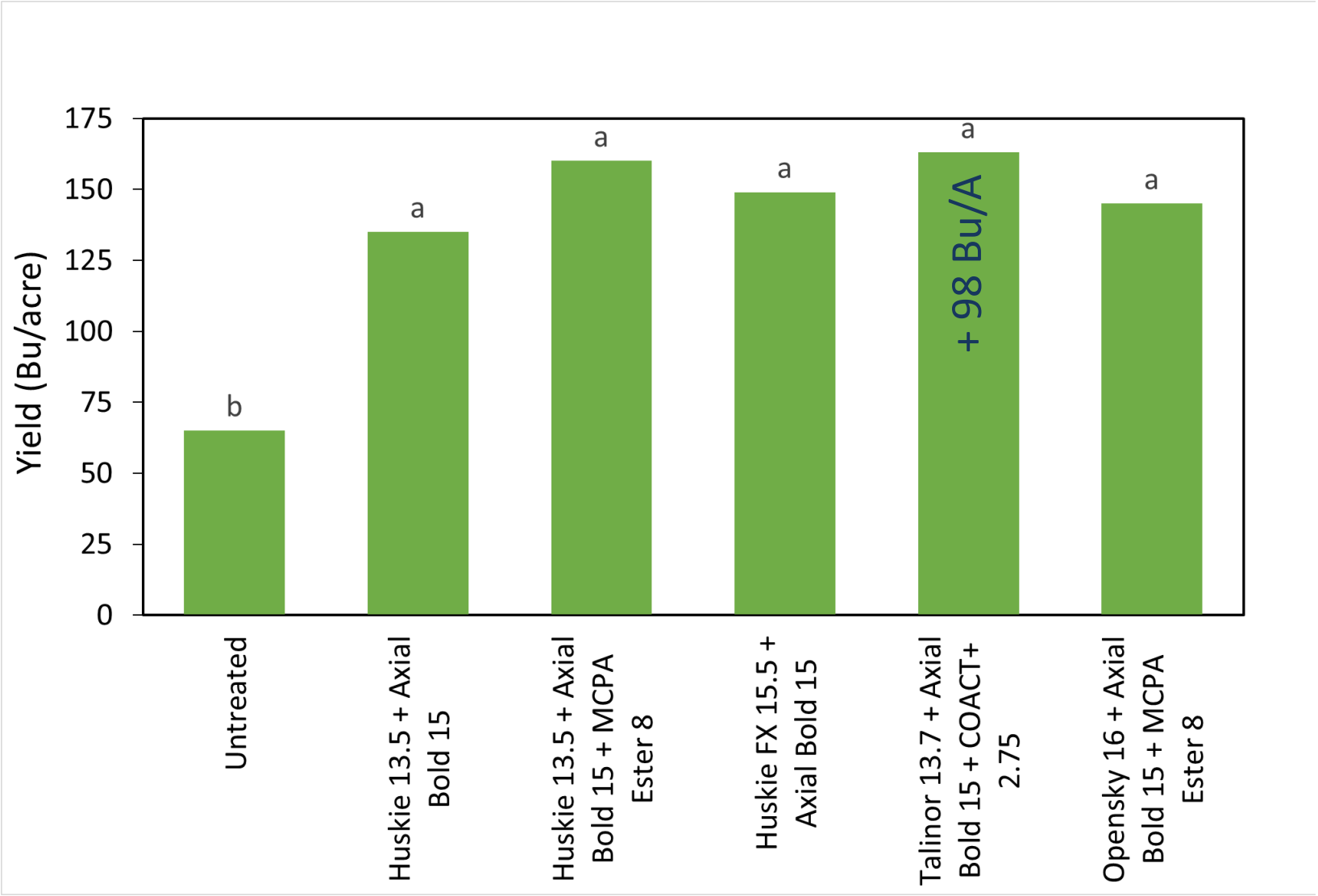
Challenges with harvest

- **Crop lodging**
- **Uneven maturity**
- **Increased biomass**

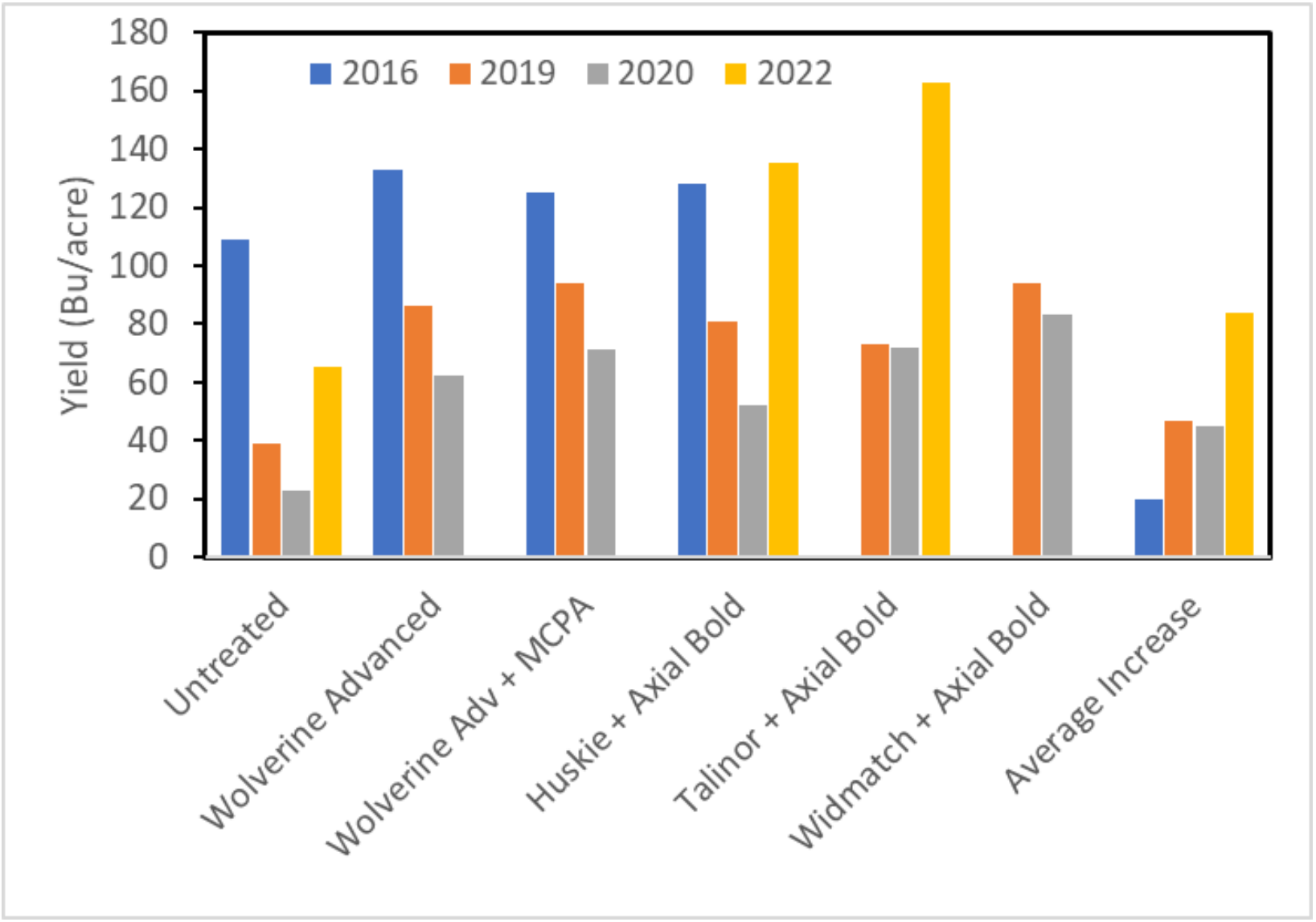
Wild Oat Control in Barley 2020



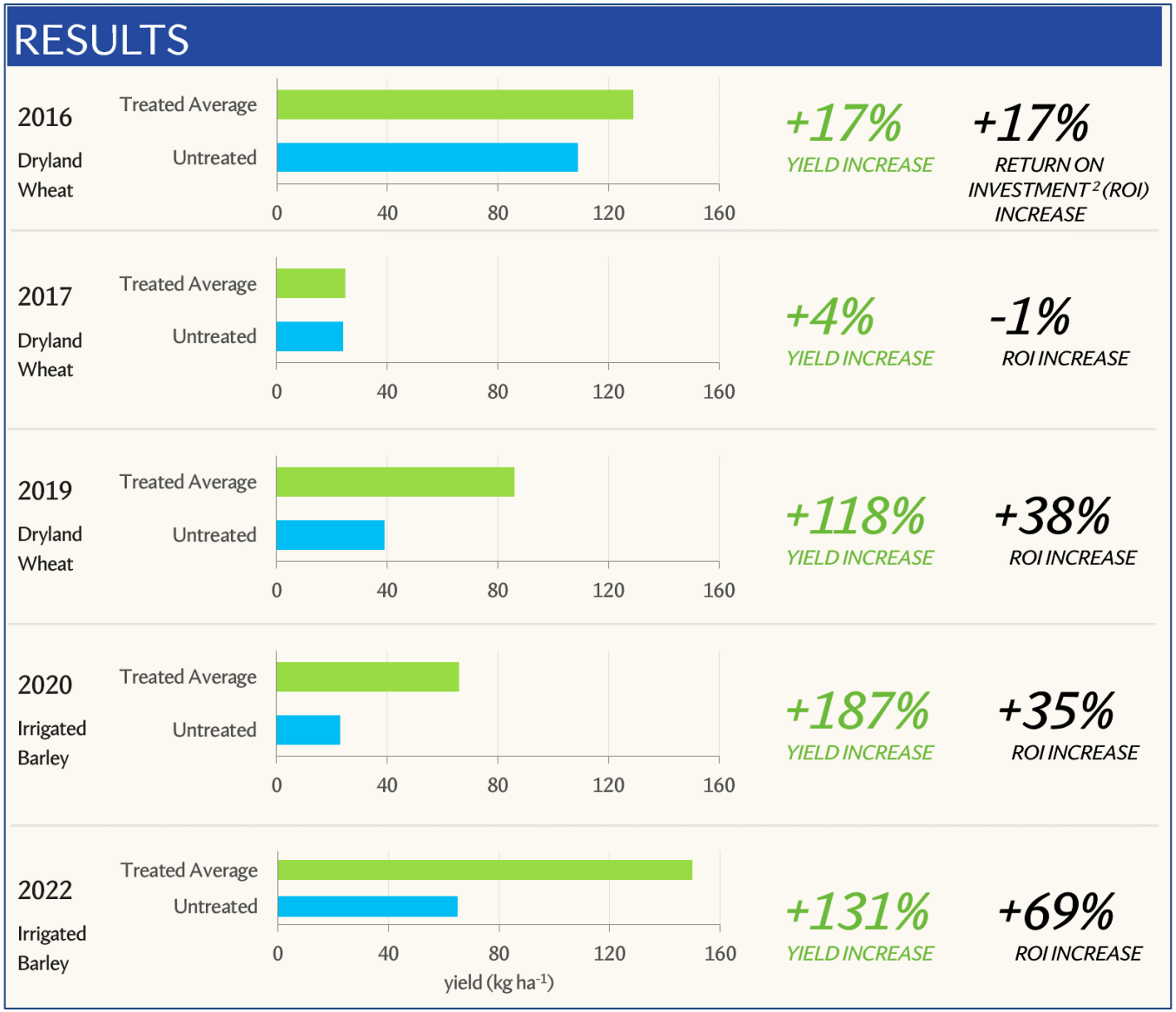
Wild Oat Control in Barley 2022

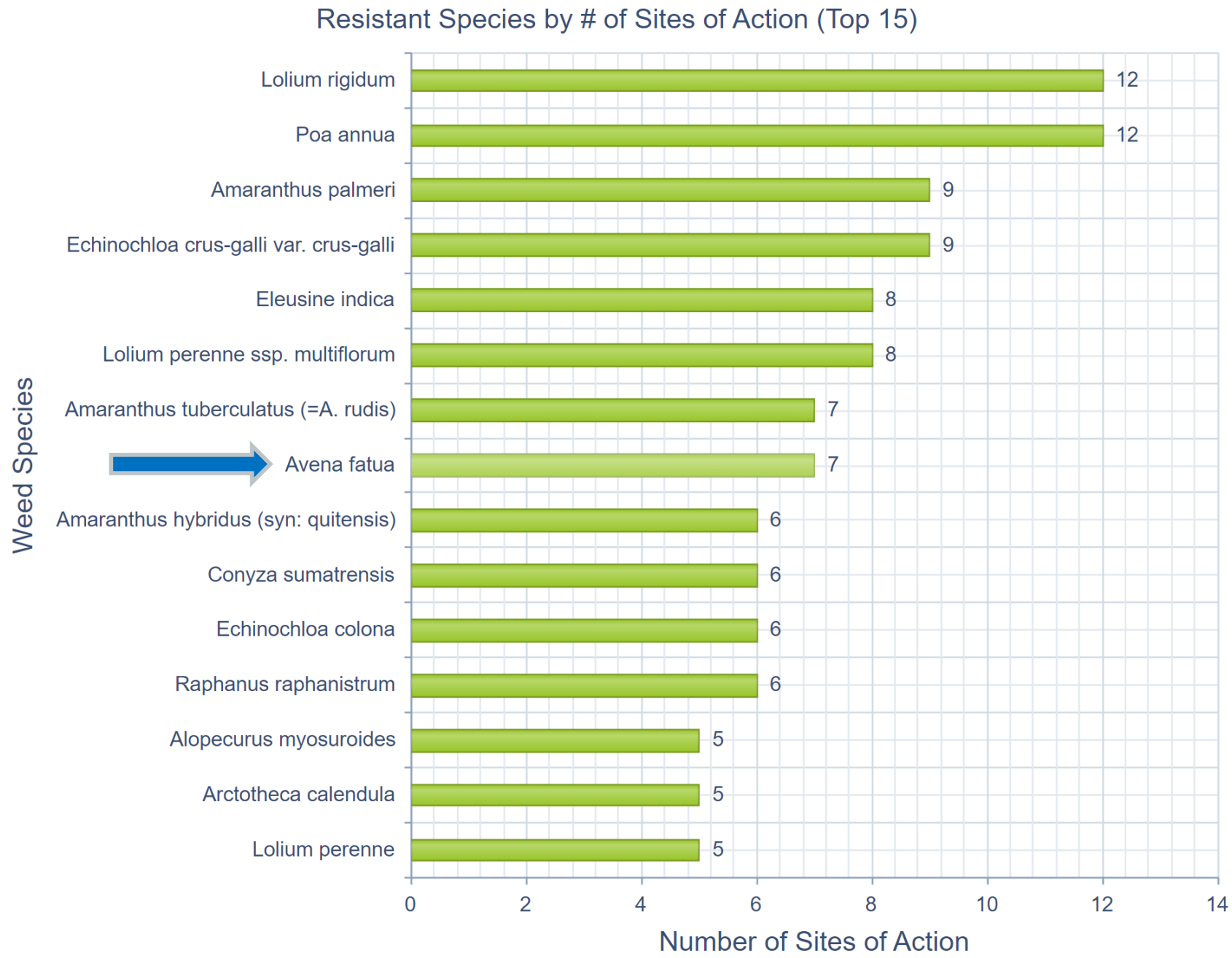


Wild Oat Control in Small Grains



Economic Returns from Wild Oat Control





Wild Oat Management Conclusions

Controlling wild oats in small grains almost always pays for itself, sometimes many fold

Integrated management is necessary to avoid selecting herbicide resistance (rotate modes of action, crop rotation, etc.)


Questions?