

A Weed Scientist's Perspective on Cover Crops in Missouri

**Kevin Bradley
University of Missouri**





Introduction

- Economic incentives (~\$25-38/A) have led to increased interest in Midwest crop production systems
- A variety of cover crop species are discussed; little is known about their suitability for use in Missouri corn /soybean rotations

From a weed scientist's perspective...

- 1. We must be able to effectively kill whatever cover crop species we are planting.**
- 2. We must have a real understanding of what cover crops actually do for weed control.**
- 3. We must know which corn or soybean herbicides are most likely to carryover and cause injury to cover crop species.**

Materials and Methods

General: Individual plots 10 x 30 ft, arranged in a RCB or split plot design with 4 replications

Planting Dates: September 5-6, 2012; September 11, 2013

Seeding Rates (lbs/A):

Wheat =	120
Cereal Rye =	110
Italian ryegrass =	25
Oats =	70
Crimson Clover =	30
Austrian Winter Pea =	50
Hairy Vetch =	20
Tillage Radish =	8

Herbicide Applications: Made with a CO₂-powered backpack sprayer delivering 15 GPA with XR8002 flat fan nozzles

All cover crops should not be viewed equally...



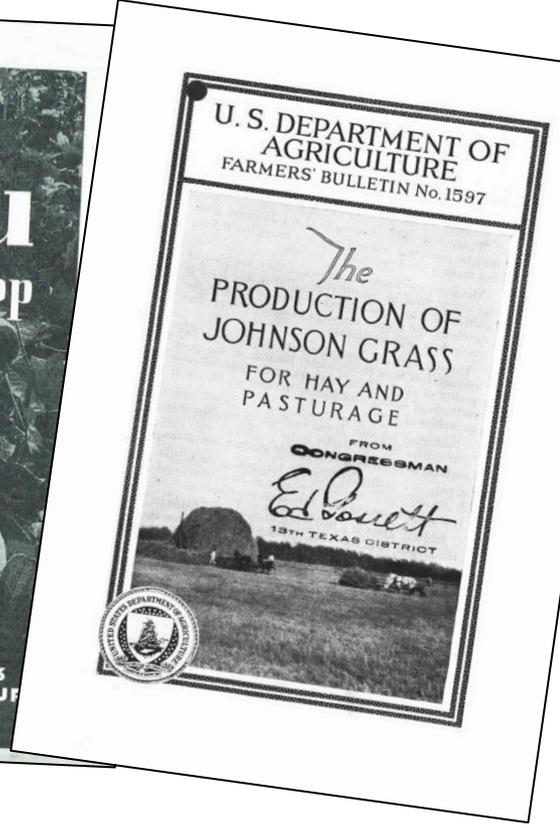
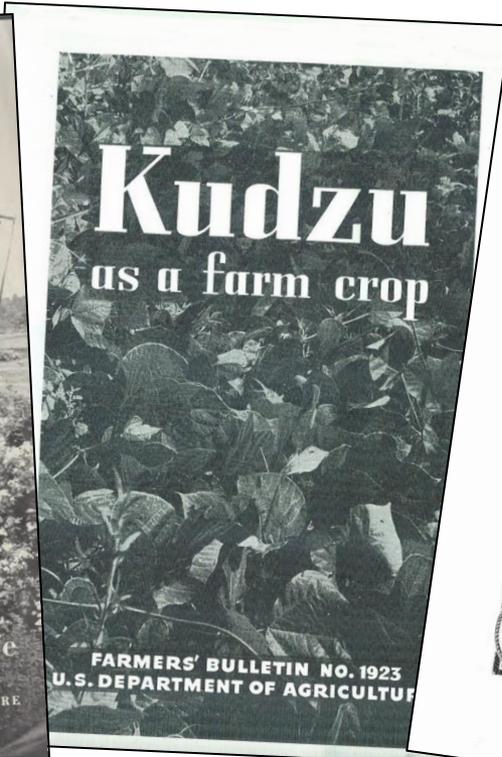
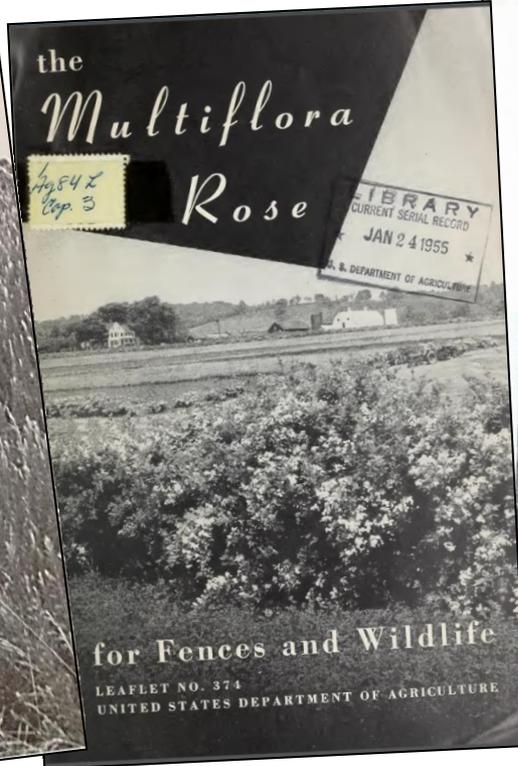
Italian Ryegrass

Lolium multiflorum

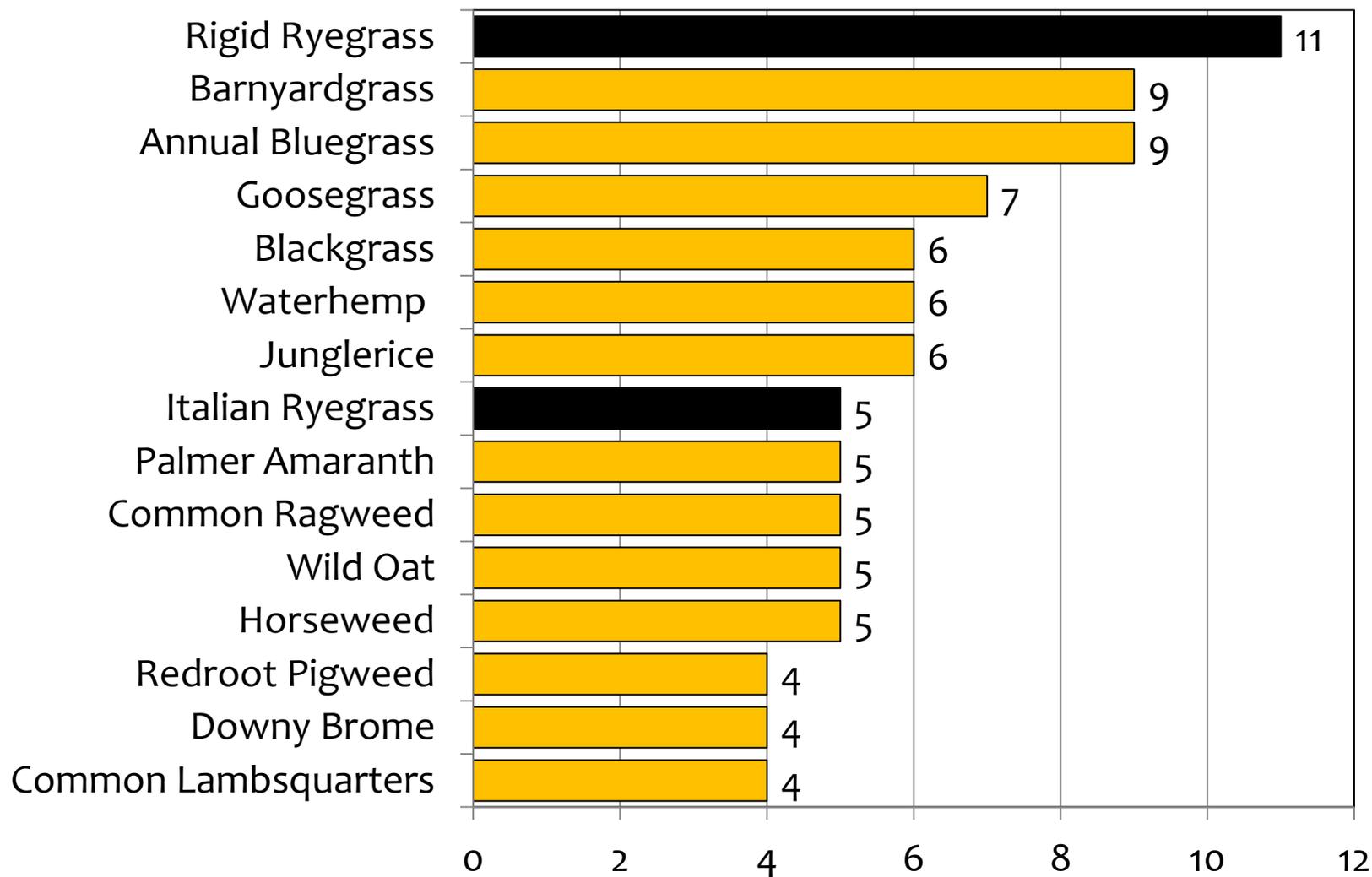
a.k.a. “Annual Ryegrass” or just “Ryegrass”
NOT Annual Rye



Common Denominator?

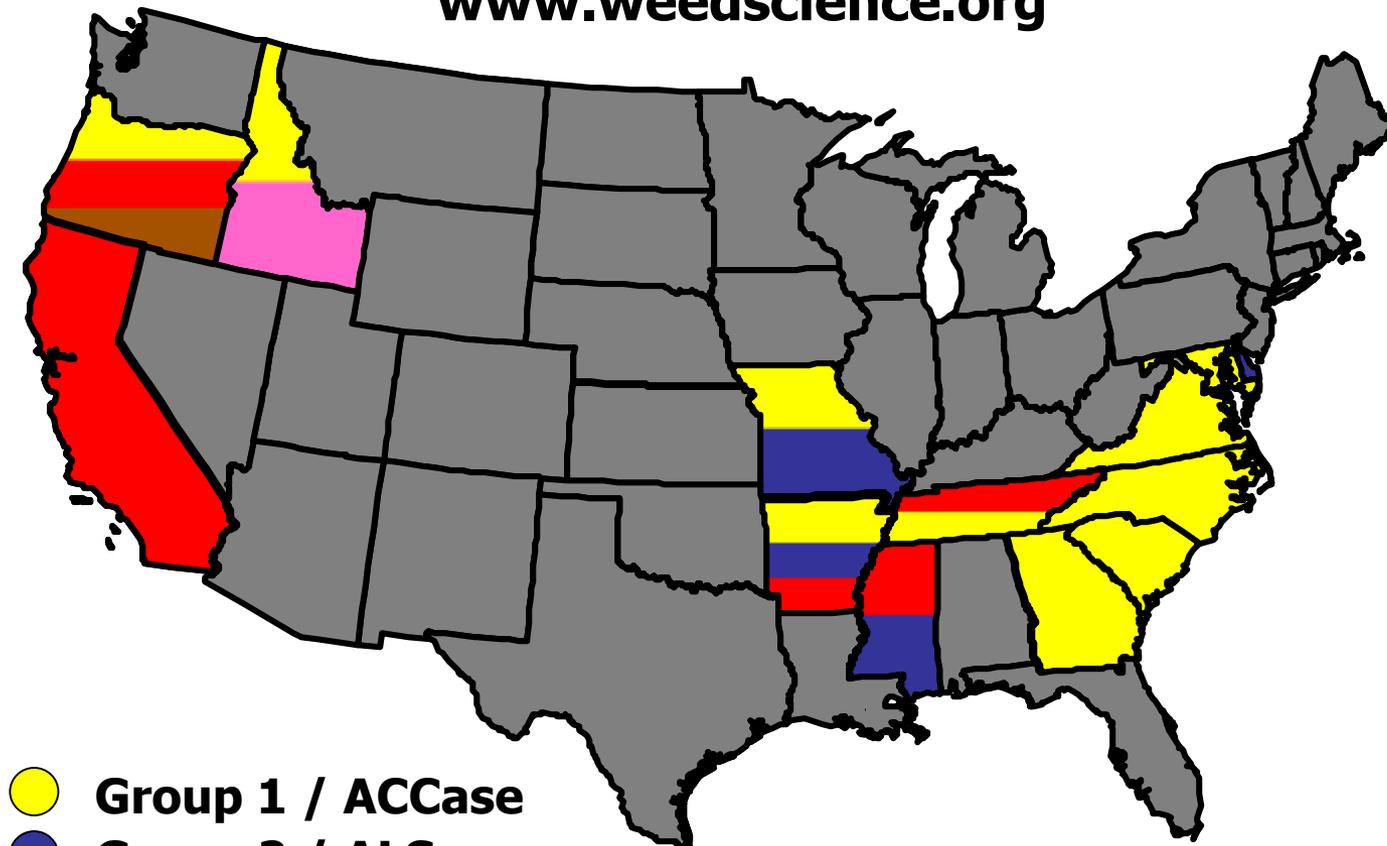


Top 15 Resistant Weeds According to # of Herbicide Modes of Action



Herbicide Resistance in Annual/Italian Ryegrass, 2014

www.weedscience.org



- Group 1 / ACCase
- Group 2 / ALS
- Group 9 / Glyphosate
- Group 10 / Liberty
- Group 15 / Chloroacetamides

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Herbicide Resistance in Annual/Italian Ryegrass (Worldwide, 2014)



- **Group 1 / ACCase**
- **Group 2 / ALS**
- **Group 9 / Glyphosate**

- **Group 10 / Glufosinate**
- **Group 15 / Chloroacetamides, etc.**
- **Group 7 / Ureas, Amides**

Influence of Herbicide Treatments and Timings on the Control of an Italian Ryegrass Cover Crop (Columbia, Missouri 2013)

Herbicide Treatment	Rate	Application Timing		
		Early (April 2) 5.75"; Tillering	Mid (April 22) 14"; Pre-boot	Late (May 16) 36"; Boot
		--% Ital. Ryegrass Biomass Reduction 28 DAT--		
Roundup PowerMax	36 fl ozs	93	80	63
Roundup PowerMax + 2,4-D	36 fl ozs + 1 pt	92	75	57
Roundup PowerMax + Clarity	36 fl ozs + 1 pt	87	65	64
Roundup PowerMax + Sharpen	36 fl ozs + 1 fl oz	90	76	54
Roundup PowerMax + Aatrex	36 fl ozs + 1 qt	91	81	55
Roundup PowerMax + Canopy	36 fl ozs + 4 ozs	88	79	47
Roundup PowerMax + Basis Blend	36 fl ozs + 1.25 ozs	83	78	56
Roundup PowerMax	72 fl ozs	90	78	65
Gramoxone Inteon	4 pts	78	77	44
Gramoxone Inteon + 2,4-D	4 pts + 1 pt	90	77	52
Gramoxone Inteon + Aatrex	4 pts + 1 qt	87	82	54
Gramoxone Inteon + Lorox	4 pts + 24 ozs	89	83	50
Gramoxone Inteon + Sencor + 2,4-D	4 pts + 4 ozs + 1 pt	90	87	60
Liberty	29 fl ozs	35	50	34
Liberty + Atrazine	29 fl ozs + 1 qt	71	50	45
LSD _{0.05} (treatments x timings):		----- 15 -----		

You decide.
Is it worth the Risk?



Effective Kill of Cover Crop Species

- Proper herbicide timing (late March/early April) is important regardless of the species
- Species that are likely to winter kill in central Missouri = **tillage radish, oats**
- Species that have proven difficult to control = **wheat, crimson clover, Italian ryegrass**
- Species that are fairly easy to control = **cereal rye, Austrian winter pea, hairy vetch**





What kind of weed control can we expect from cover crops?

My Perspective

Based on our research and the results of other **PUBLISHED** studies, the ability of cover crops to reduce the emergence of **WINTER ANNUAL** weed species:

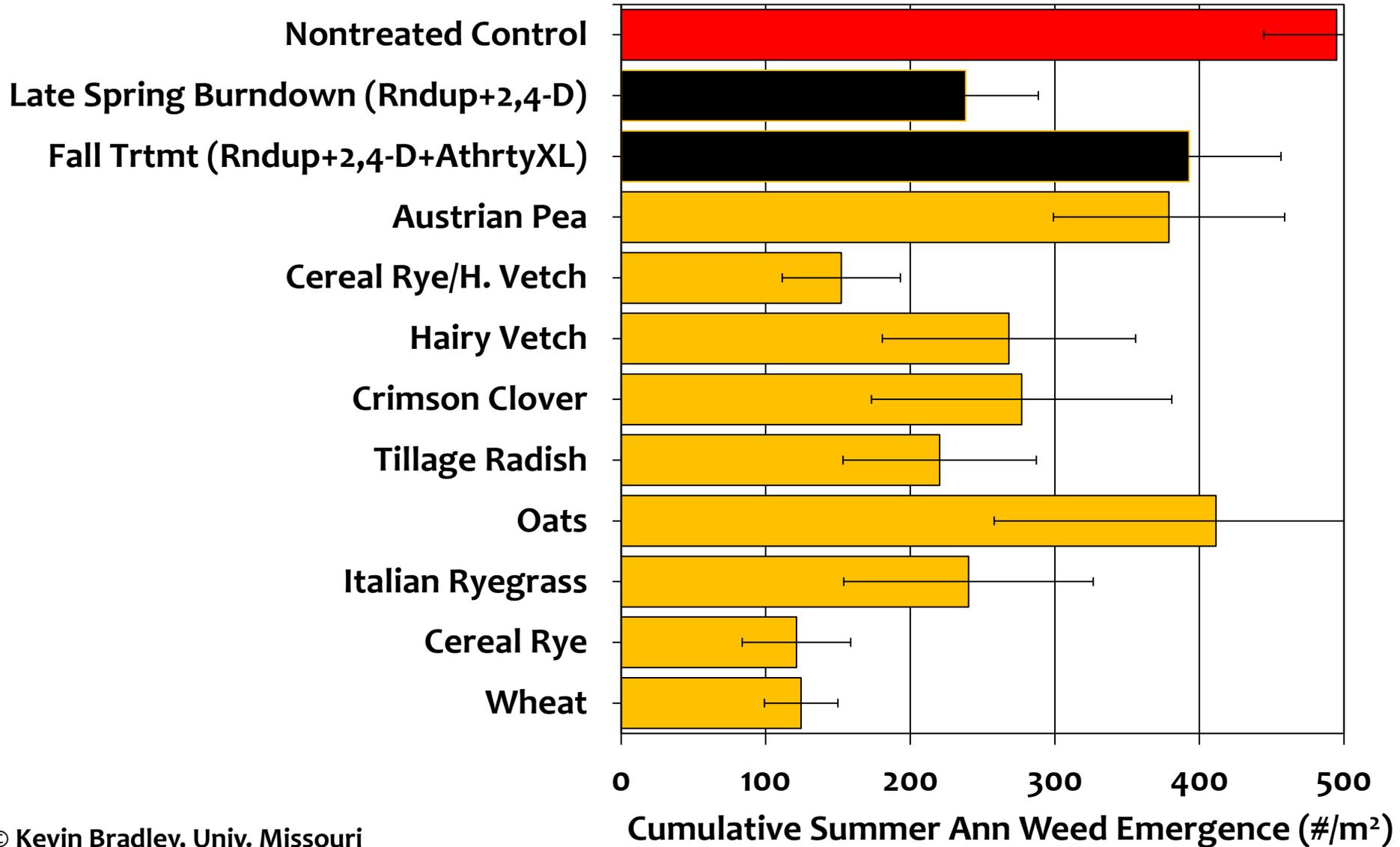
- Is variable and rarely 100%
- Is dependent on the time of winter annual weed emergence
- Is dependent on the cover crop species and/or mix selected

My Perspective

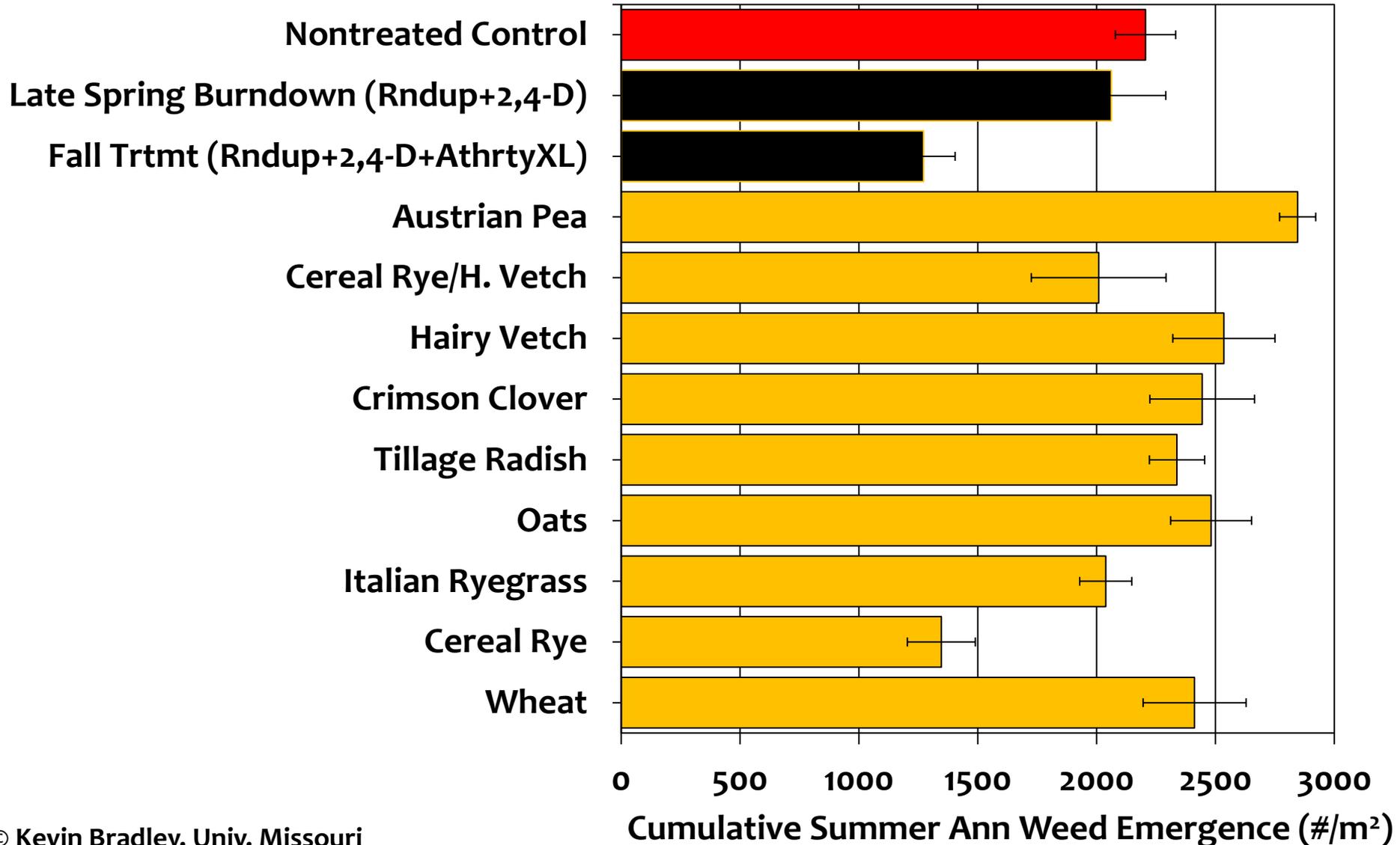
Based on our research and the results of other **PUBLISHED** studies, the ability of cover crops to reduce the emergence of **SUMMER ANNUAL** weed species is determined by the:

1. Cover crop species selected
2. Amt. of cover crop biomass accumulated
3. Time of cover crop termination
4. Type of weed species

Influence of Cover Crops vs. Herbicide Treatments on Cumulative Summer Annual Weed Emergence (Columbia, MO 2013)



Influence of Cover Crops vs. Herbicide Treatments on Cumulative Resistant Waterhemp Emergence (Moberly, MO 2013)



Influence of Cover Crops on Pigweed Emergence in Georgia

Legume Cover Crop	Early June		Late July	
	- Cereal Rye	+ Cereal Rye	- Cereal Rye	+ Cereal Rye
	---Palmer Pigweed Density (#/m ²)---			
Austrian Winter Pea	4	1	23	15
Vetch	3	0	25	12
Crimson Clover	18	3	25	16
None	46	8	22	14
LSD _{0.05}	----- 18 -----		----- 9 -----	

Summary / Final Thoughts

Species Selection: We really need to think about this...

Burndown: Timely herbicide applications are required to achieve acceptable kill of certain cover crop species, especially Italian ryegrass, wheat, and crimson clover.

Effects on Weed Emergence: Only cereal rye and wheat provided substantial reductions in the emergence of *summer annual* weeds.





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Spiny amaranth (*Amaranthus spinosus*) infesting a pasture in northwest Missouri.



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Website:

<http://weedsience.missouri.edu>

E-mail:

bradleyke@missouri.edu