

Evaluation of Herbicide Programs for the Termination of Cover Crop Species in the Spring





Materials and Methods

General: Identical field experiment conducted in Columbia, MO in 2013, 2014 and 2015

Planting Dates: September 11, 2012; September 11, 2013 and September 13, 2014

Termination Dates: Early April and early May each year

Seeding Rates (lbs/A):

Wheat	120
Cereal Rye	110
Italian ryegrass	25
Oats	70
Crimson Clover	30
Austrian Winter Pea	50
Hairy Vetch	30
Cereal Rye+Hairy Vetch	70+30

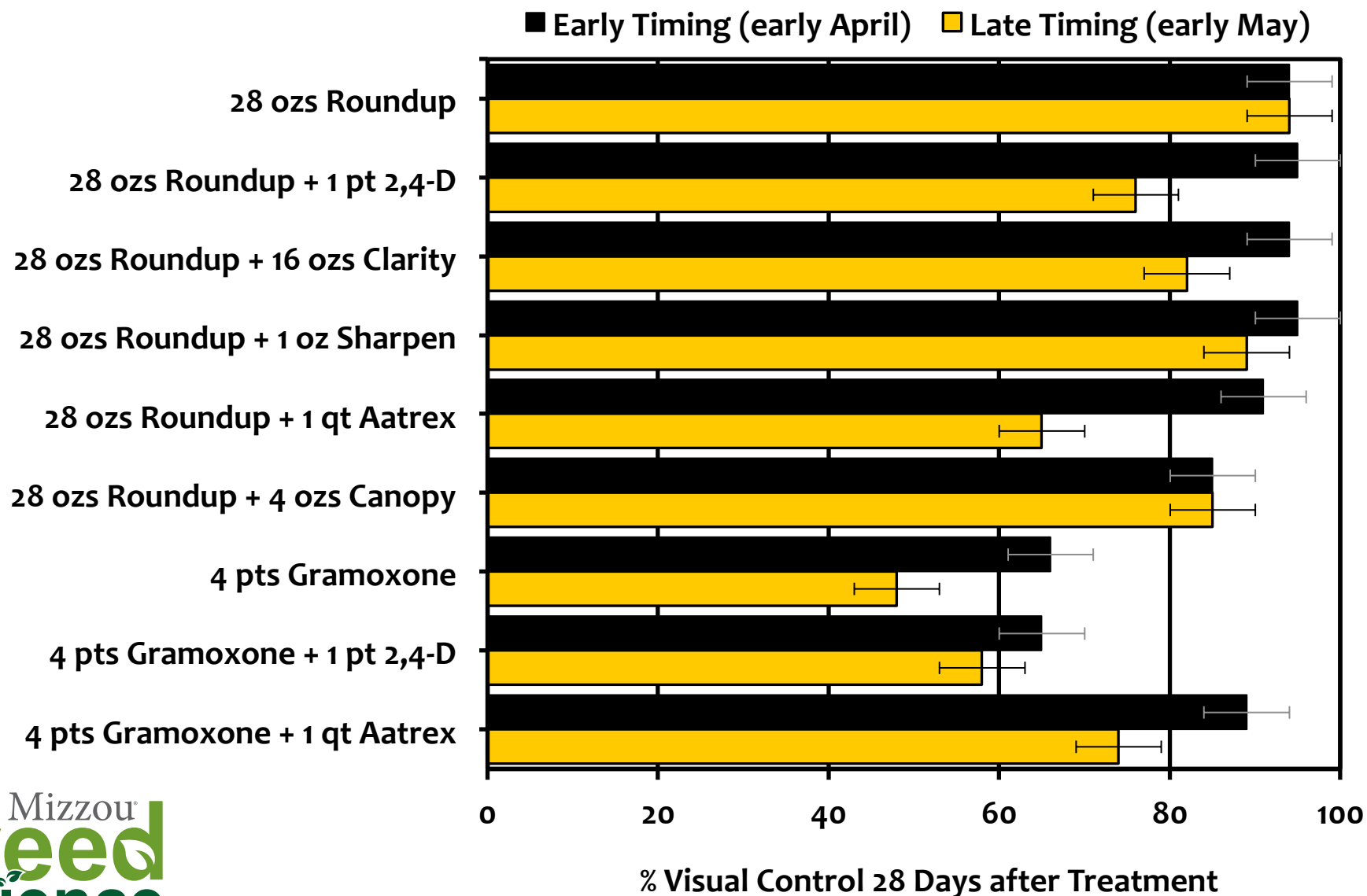


Some species will winter kill....

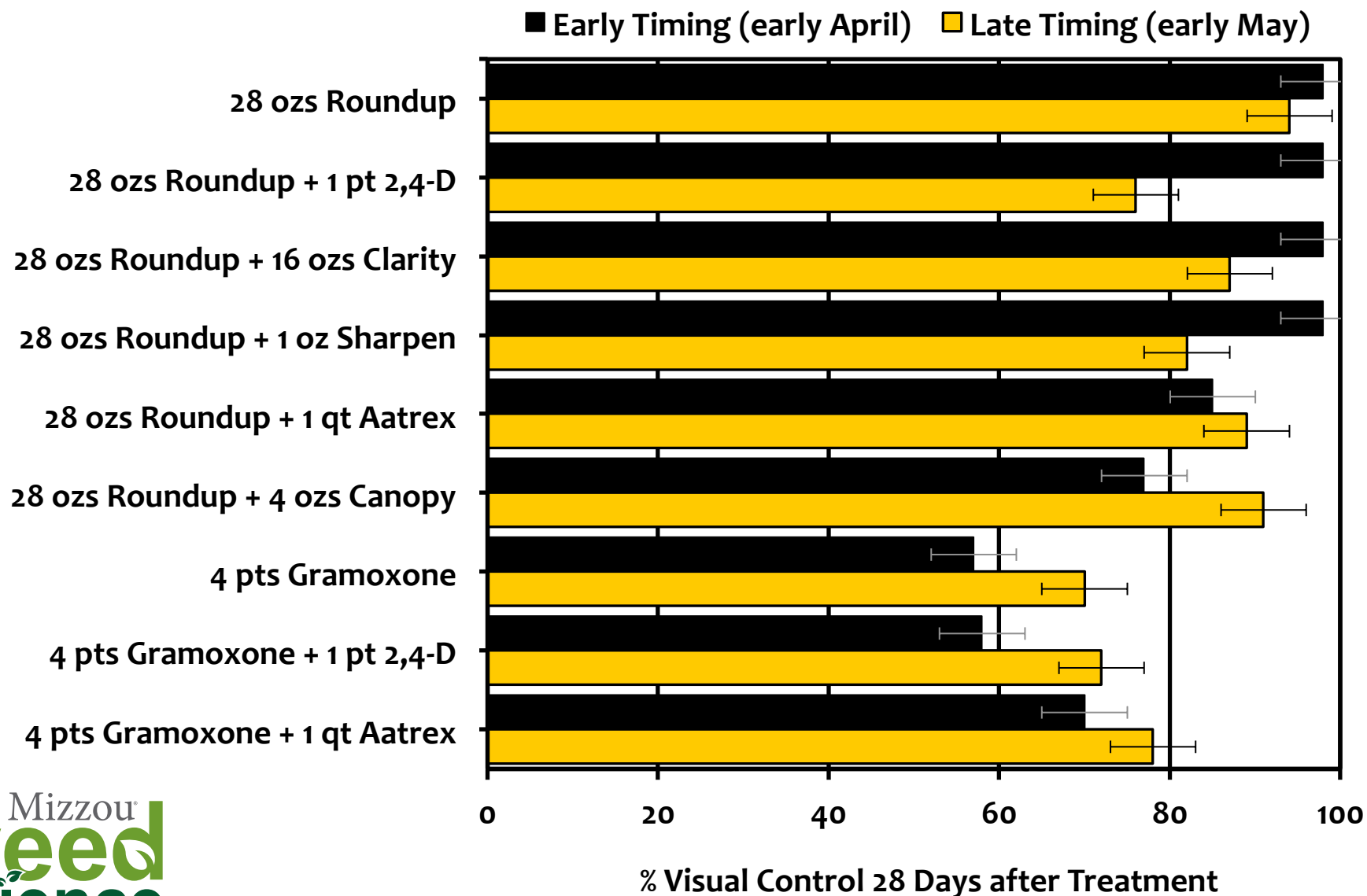
Tillage Radish 12/3/2013
Columbia, Missouri

© Kevin Bradley, Univ. Missouri

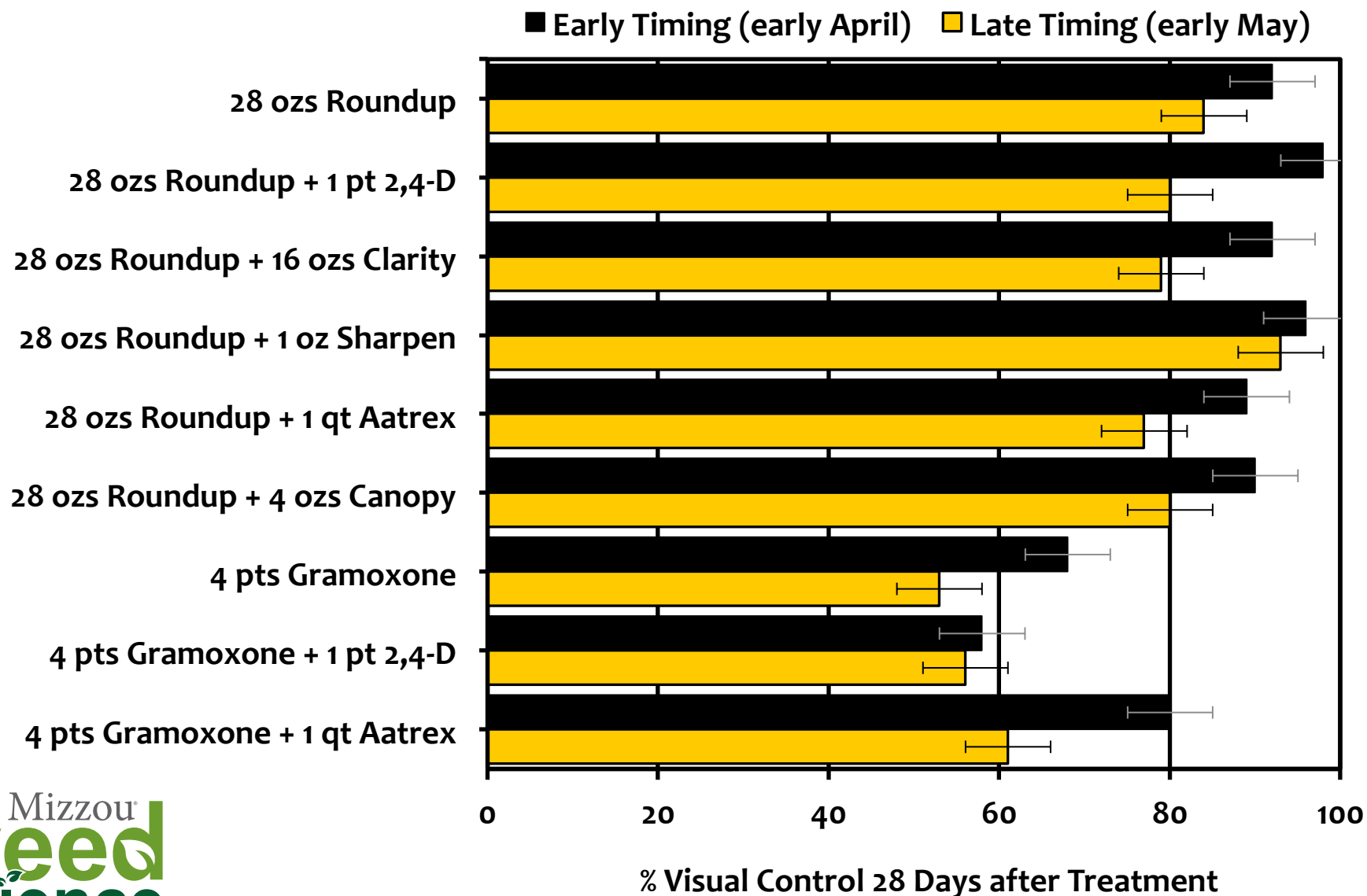
Influence of Herbicide Treatments and Application Timings on the Control of a Wheat Cover Crop (results averaged across 3 years)



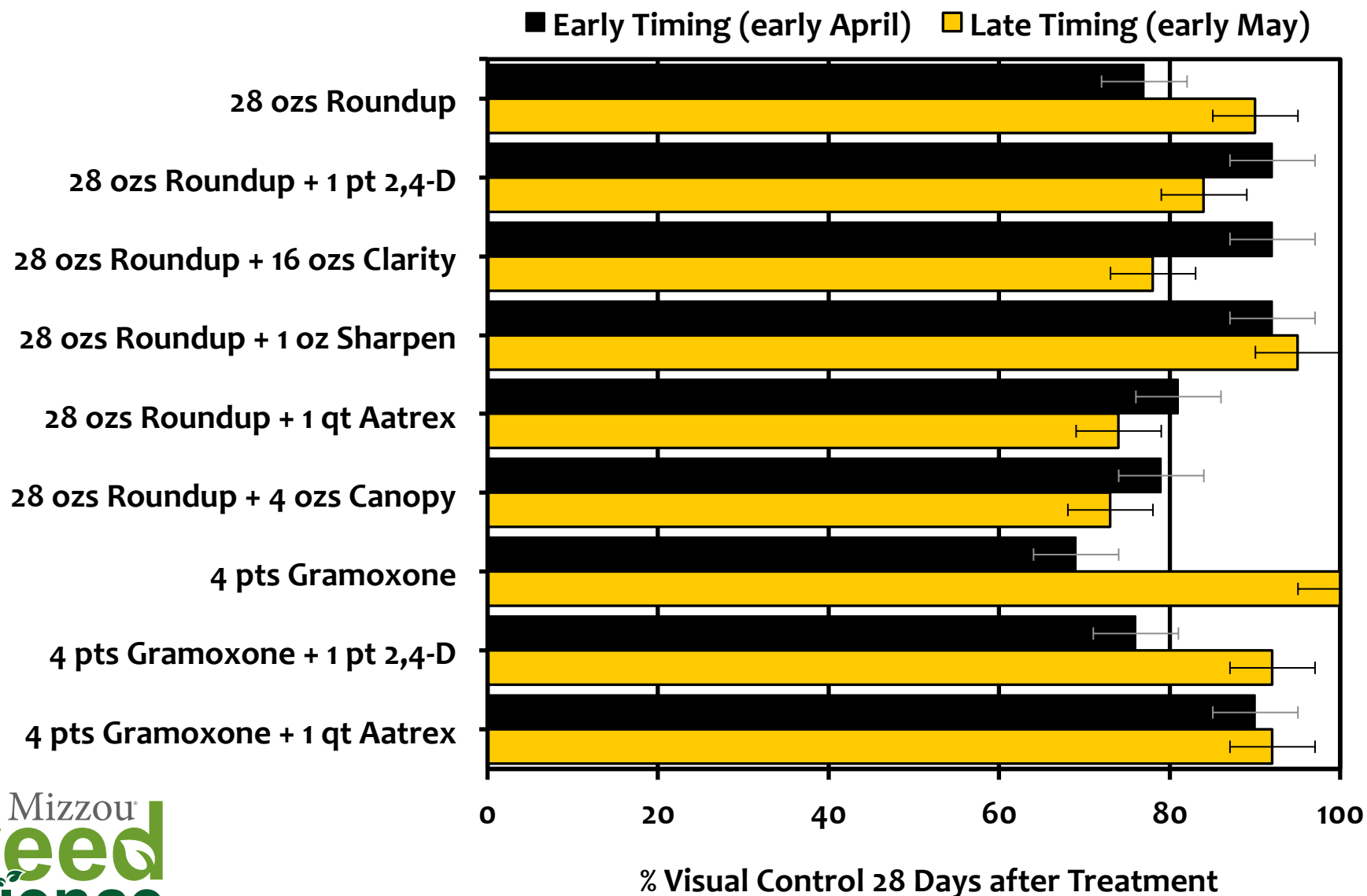
Influence of Herbicide Treatments and Application Timings on the Control of a Cereal Rye Cover Crop (results averaged across 3 years)



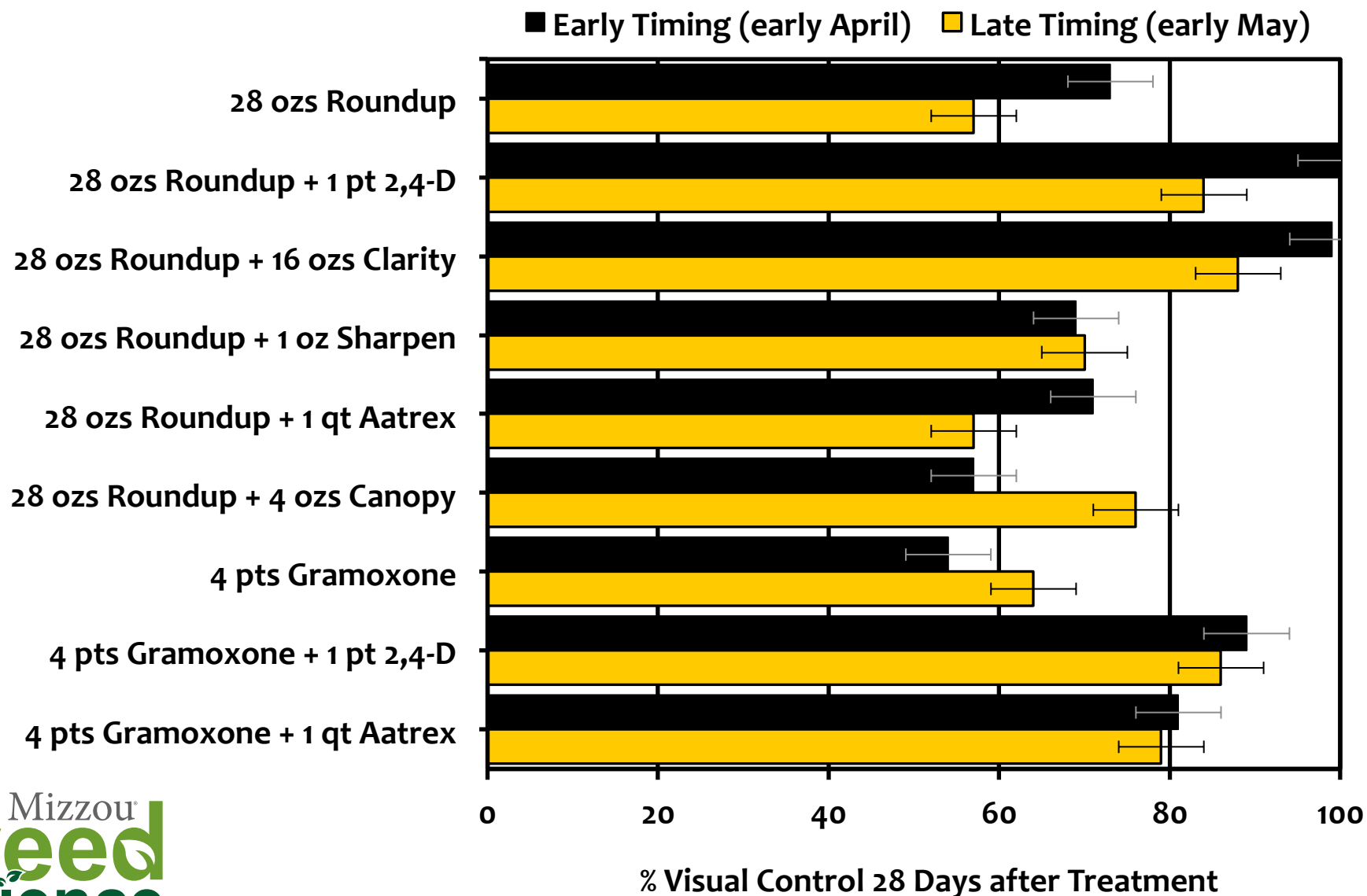
Influence of Herbicide Treatments and Application Timings on the Control of a Annual Ryegrass Cover Crop (results averaged across 3 years)



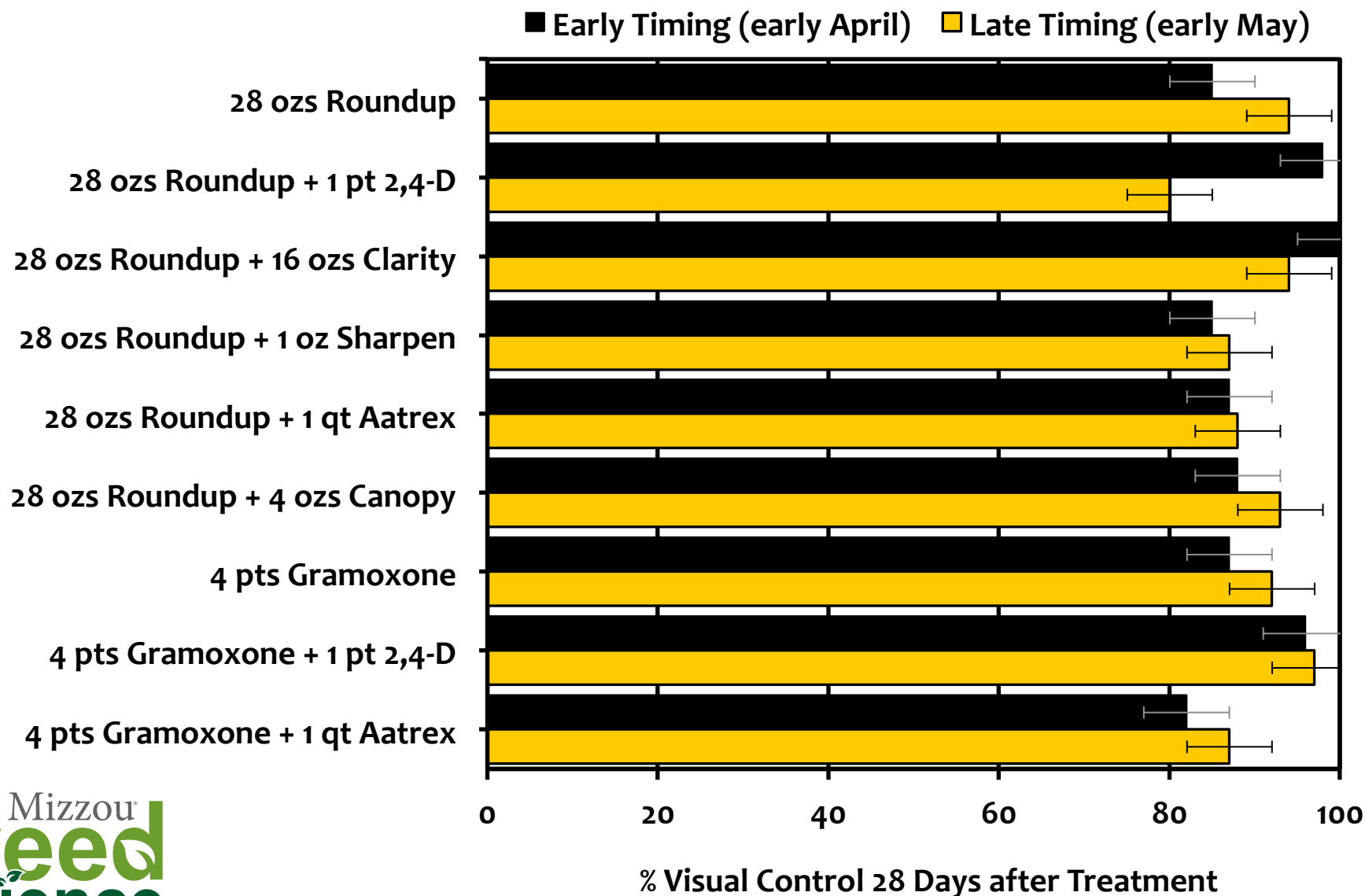
Influence of Herbicide Treatments and Application Timings on the Control of a Crimson Clover Cover Crop (results averaged across 3 years)



Influence of Herbicide Treatments and Application Timings on the Control of a Hairy Vetch Cover Crop (results averaged across 3 years)

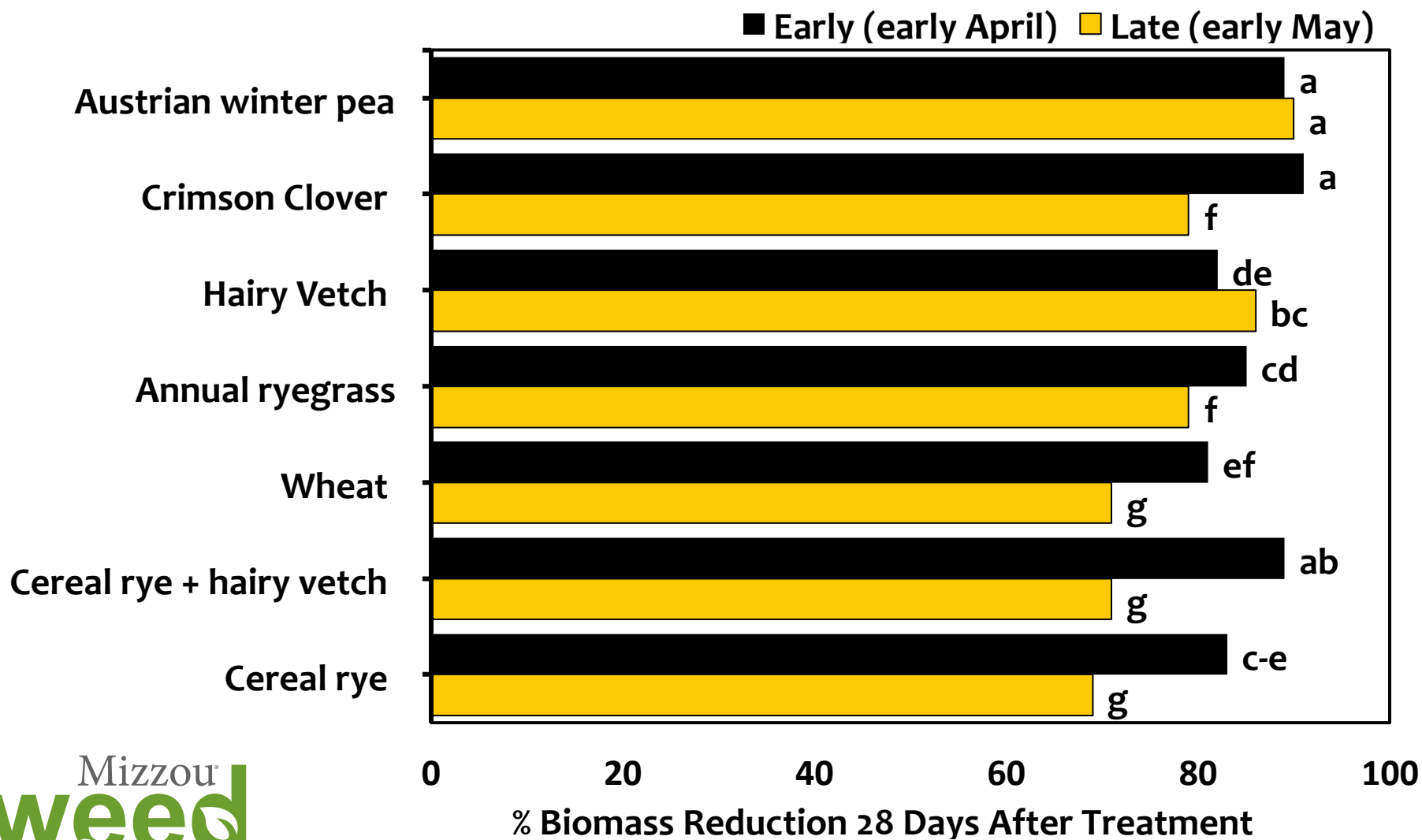


Influence of Herbicide Treatments and Application Timings on the Control of a Austrian Pea Cover Crop (results averaged across 3 years)



The Effect of Herbicide Application Timing on Biomass Reduction of Various Cover Crop Species

(results summarized across 3 years in Missouri)

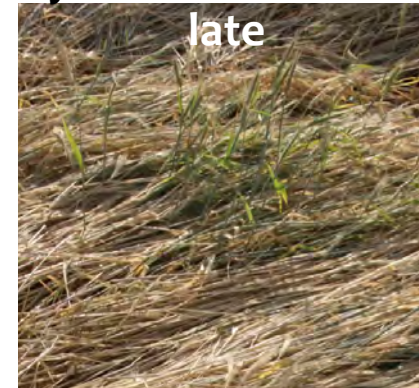


Influence of Glyphosate + 2,4-D on Burndown of Various Cover Crops

Winter Wheat



Cereal Rye



Annual Ryegrass



Crimson Clover



Hairy Vetch

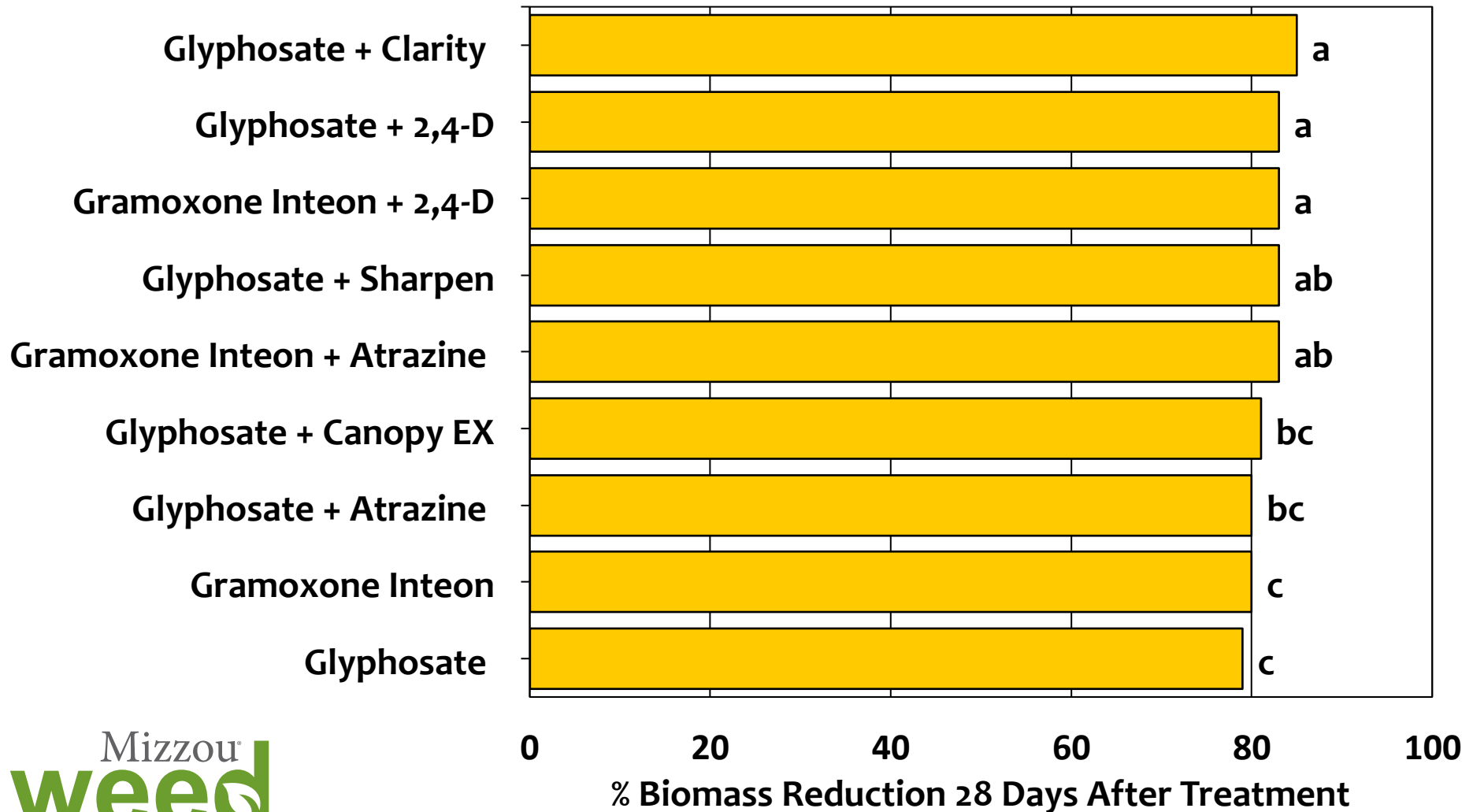


Austrian Winter Pea



Influence of Selected Herbicide Treatments on Cover Crop Biomass Reduction

(results averaged across 7 cover crop species and 3 years in Missouri)



Conclusions:

Biomass reduction in response
to **application timing**

The early application
timing resulted in
significantly greater
biomass reduction for
all cover crops except:

- Austrian Winter Pea
- Hairy Vetch



Conclusions:

Most effective herbicide program
across all cover crop species

In general, herbicide programs that contained a growth regulator resulted in the most consistent control across all cover crop species:

Biomass Reduction:

- Glyphosate + 2,4-D: 83%
- Glyphosate + Clarity: 85%

Visual Control:

- Glyphosate + 2,4-D: 90%
- Glyphosate + Clarity: 90%



Glyphosate + 2,4-D



All cover crops should not be viewed equally...



Annual Ryegrass

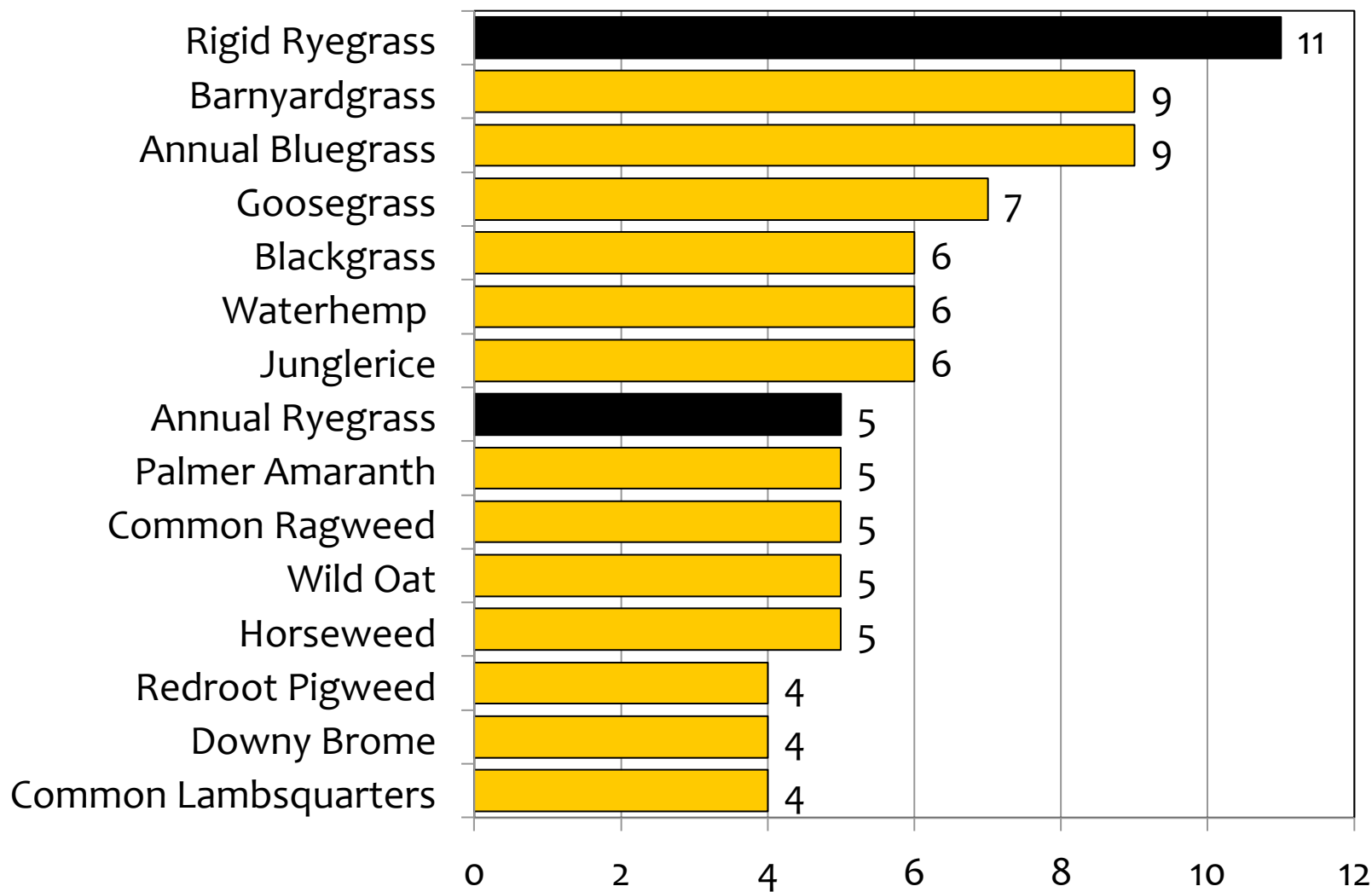
Lolium multiflorum

a.k.a. “Italian Ryegrass” or just “Ryegrass”

NOT Annual Rye NOT Cereal Rye

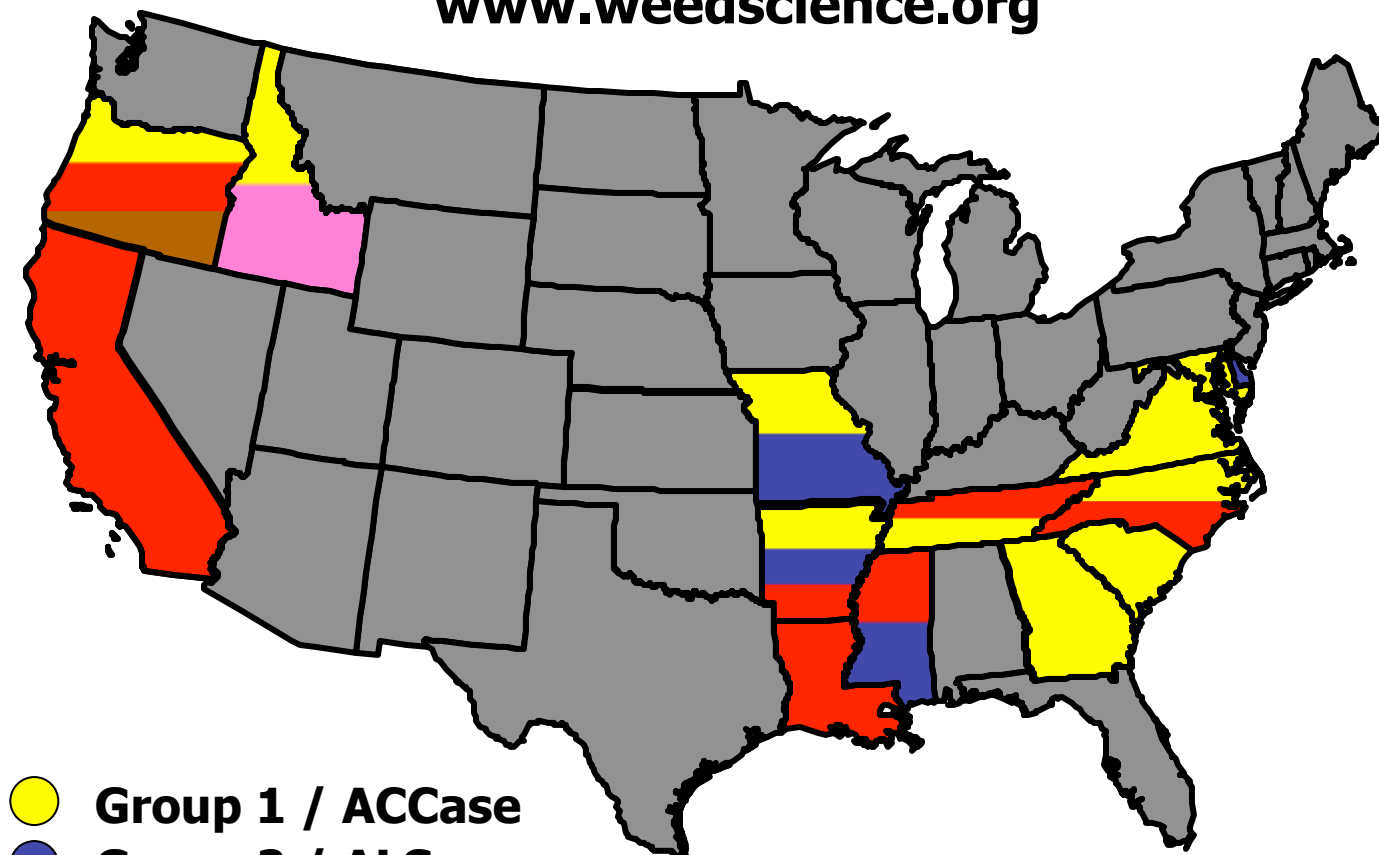


Top 15 Resistant Weeds According to # of Herbicide Modes of Action



Herbicide Resistance in Annual Ryegrass, 2015

www.weedscience.org



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



Glyphosate-resistant ryegrass is now one of the most significant weed problems in many southern states



Photo courtesy of Dr. Larry Steckel

Influence of Herbicide Treatments and Timings on the Control of an Annual 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
---product/A---		--% Ann. 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
Gromoxone 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 -----		

36 fl ozs Roundup PowerMax + 1 qt Aatrex

April 2nd application



April 22nd application



May 16th application



photos taken on June 1st

Effective Kill of Cover Crop Species

- Proper herbicide timing (late March/early April) is important for most species
- Proper temperature/environment before and after application may be just as important
- Species that are likely to winter kill in central Missouri = **tillage radish, sometimes 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,**

