

A Review of the Effects of Various Cover Crop Species on Winter and Summer Annual Weed Emergence

Dr. Kevin Bradley
University of Missouri

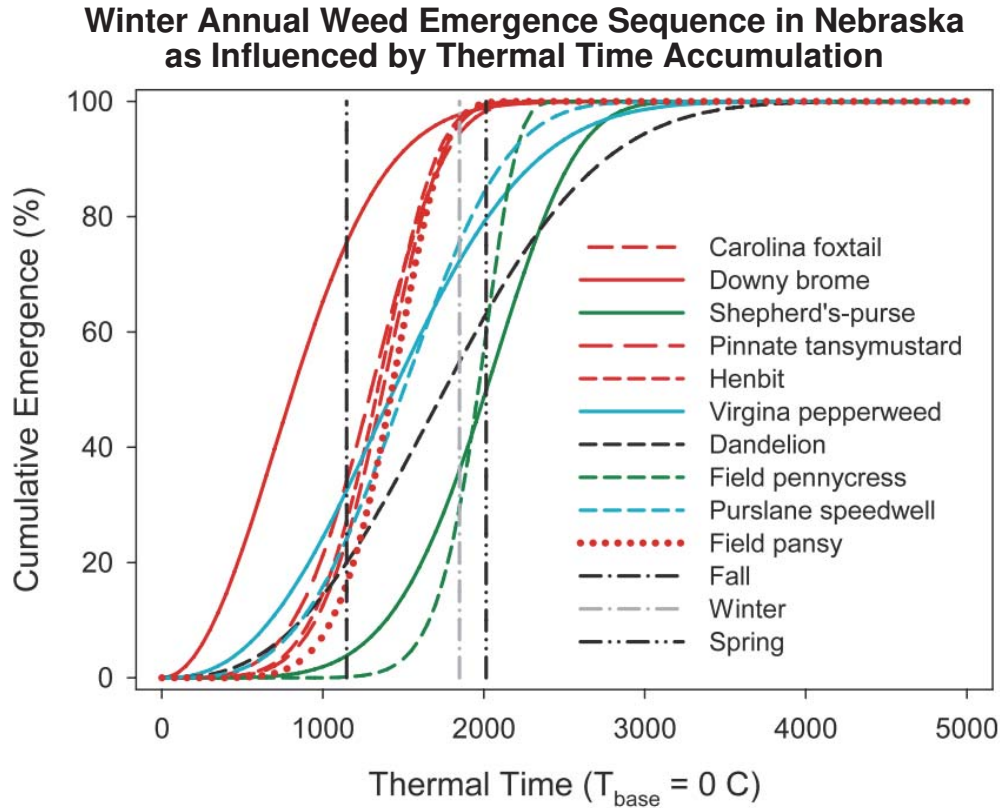
My Perspective

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

Cover Crops are a Great Fit for Winter Annual Weeds!

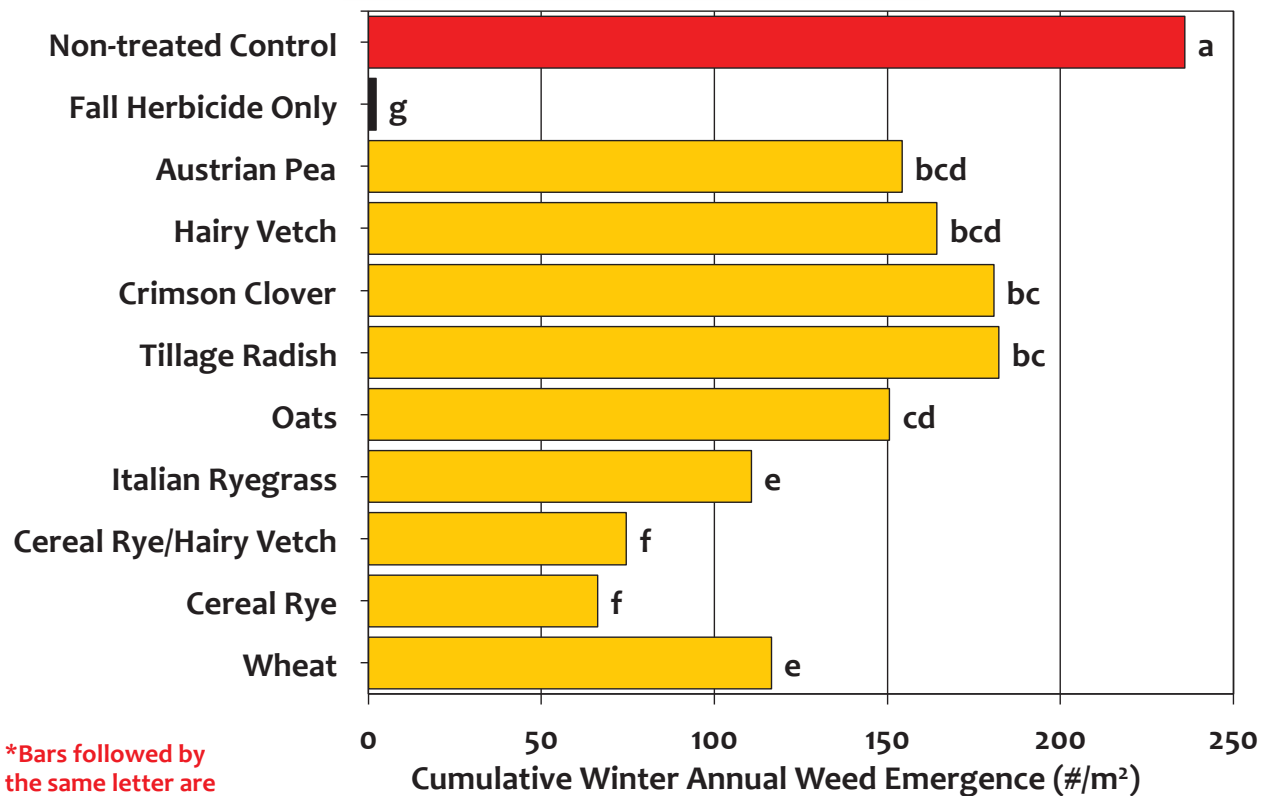
Successful Establishment of Cover Crops = Reduction in Winter annual Weed Emergence



Werle et al. 2014. Weed Science 62:83-96.

Influence of Cover Crops vs. Herbicide Treatments on Cumulative Winter Annual Weed Density

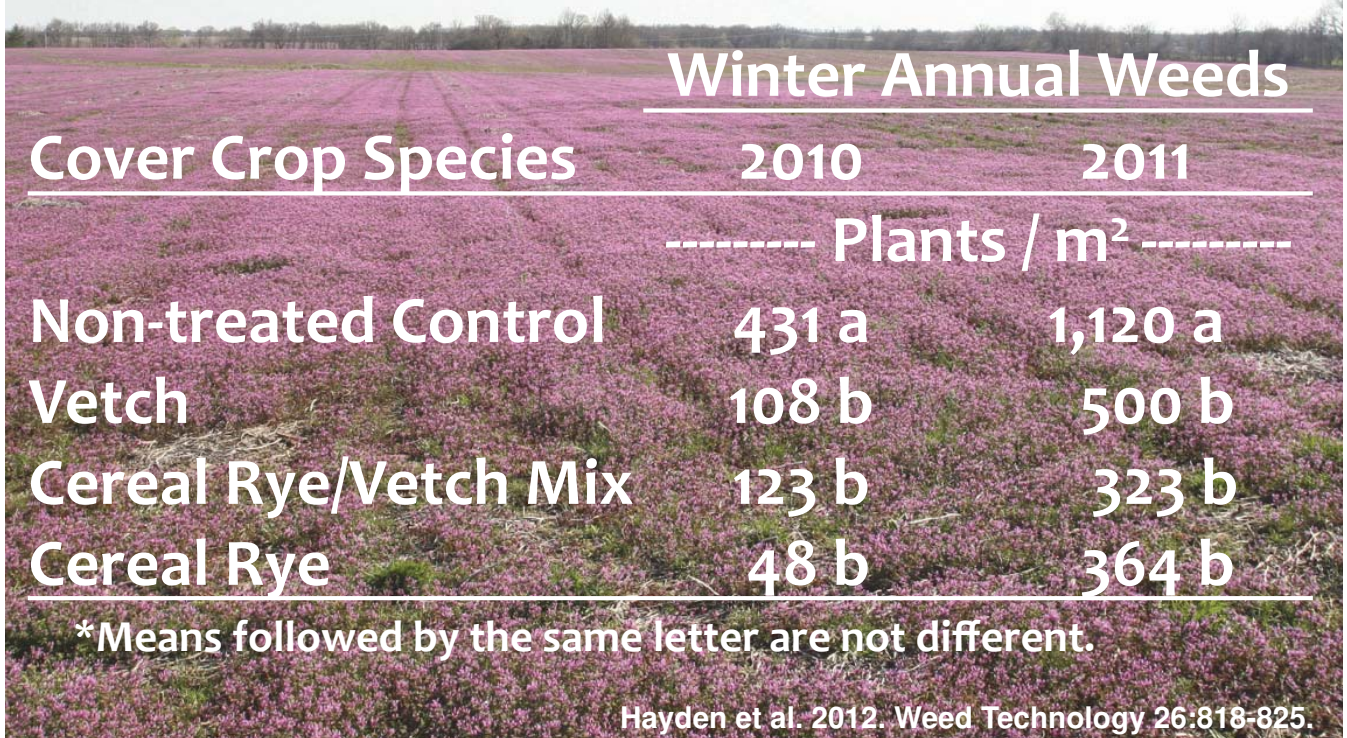
(results summarized across 9 site-years in Missouri)



*Bars followed by the same letter are not different, $LSD_{0.05}$

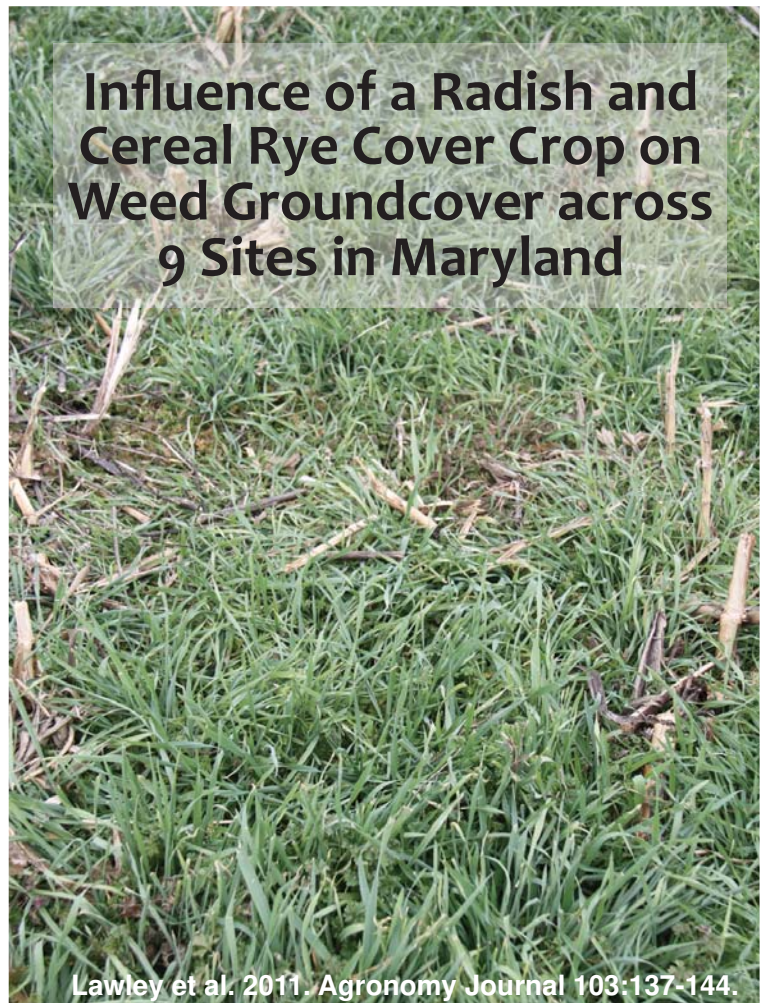
Cornelius and Bradley. 2017. Weed Technology.

Influence of Vetch and Cereal Rye Cover Crops on Winter Annual Weed Density in Maryland



Location	Field	Percentage of ground covered by weeds		
		Forage radish	No cover crop	Rye
		%		
		<u>Late fall</u>		
BARC-NF	A	0b	40a	–
	B	0b	83a	–
	C	0b	24a	–
BARC-SF	D	0c	78a	–
	E	0c	94a	10b
	F	0b	96a	0b
	G	0b	94a	0b
CMREC	I	0b	8a	0b
WREC	J	0b	47a	0b
		<u>Late March</u>		
BARC-NF	A	0b	84a	–
	B	1b	39a	–
	C	0b	71a	–
BARC-SF	E	0c	71a	7b
	F	3b	99a	1b
	G	1b	97a	0b
CMREC	H	22b	53a	4c
WREC	I	0b	22a	0b
	J	2b	55a	0b
		<u>Typical time of corn planting</u>		
BARC-NF	A	37c	95a	–
	B	19	.†	–
	C	11b	87a	–
BARC-SF	E	3	.†	.†
	F	37ab	75a	0b
	G	11	.†	.†
CMREC	H	63	.†	.†
	I	4	.†	.†

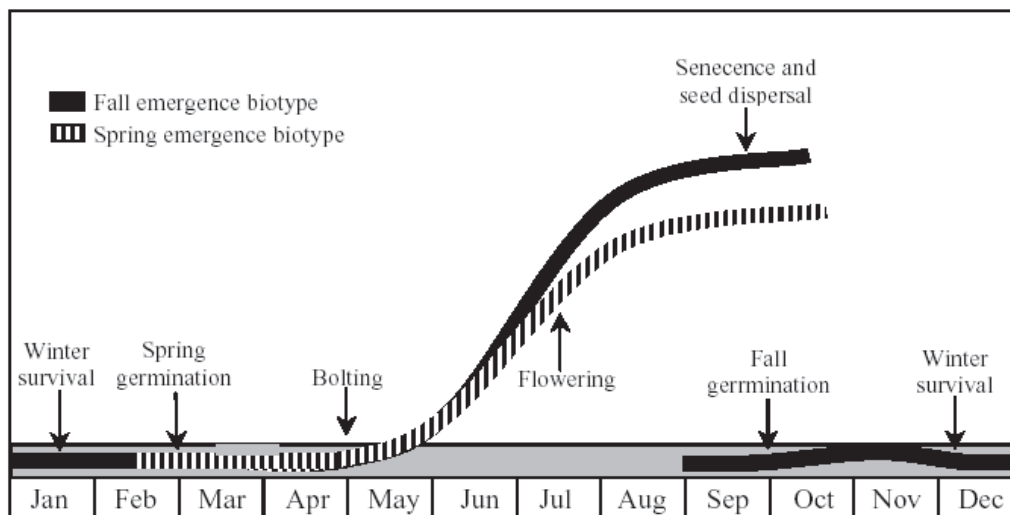
† Weeds sprayed with herbicides before typical time of corn planting.



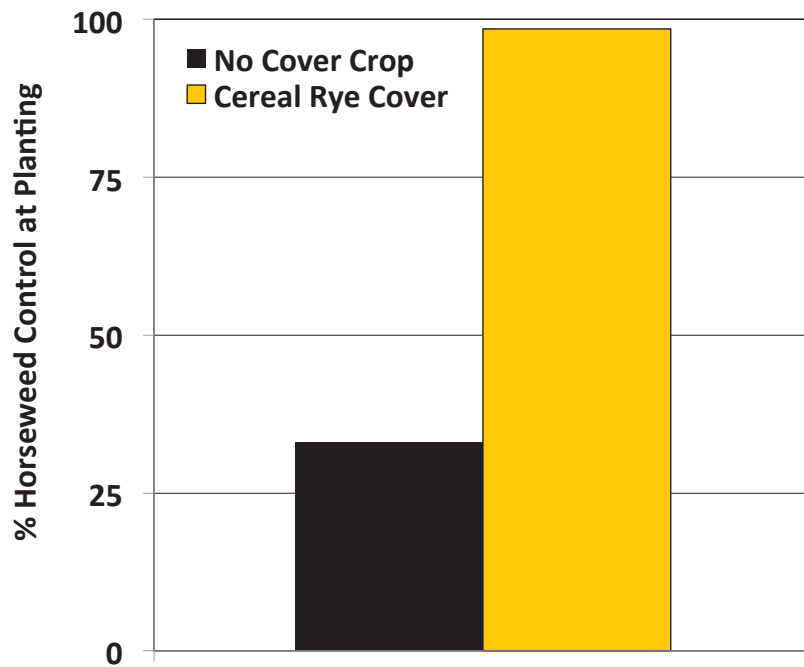
Successful cover crop establishment will prevent the emergence of horseweed (a.k.a. marestail), one of the most widespread glyphosate-resistant weeds in the U.S.



Horseweed Life Cycle



Integration of a Cereal Rye Cover Crop for the Control of Glyphosate-resistant Horseweed/Marestail



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. Amount of cover crop biomass accumulated
3. Time of cover crop termination/rate of cover crop decay
4. Type of weed species

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All cover crops should not be viewed equally...

- Consider how easy or difficult it might be to terminate the cover crop you select.
- Consider the “weediness” potential of the cover crop you select.

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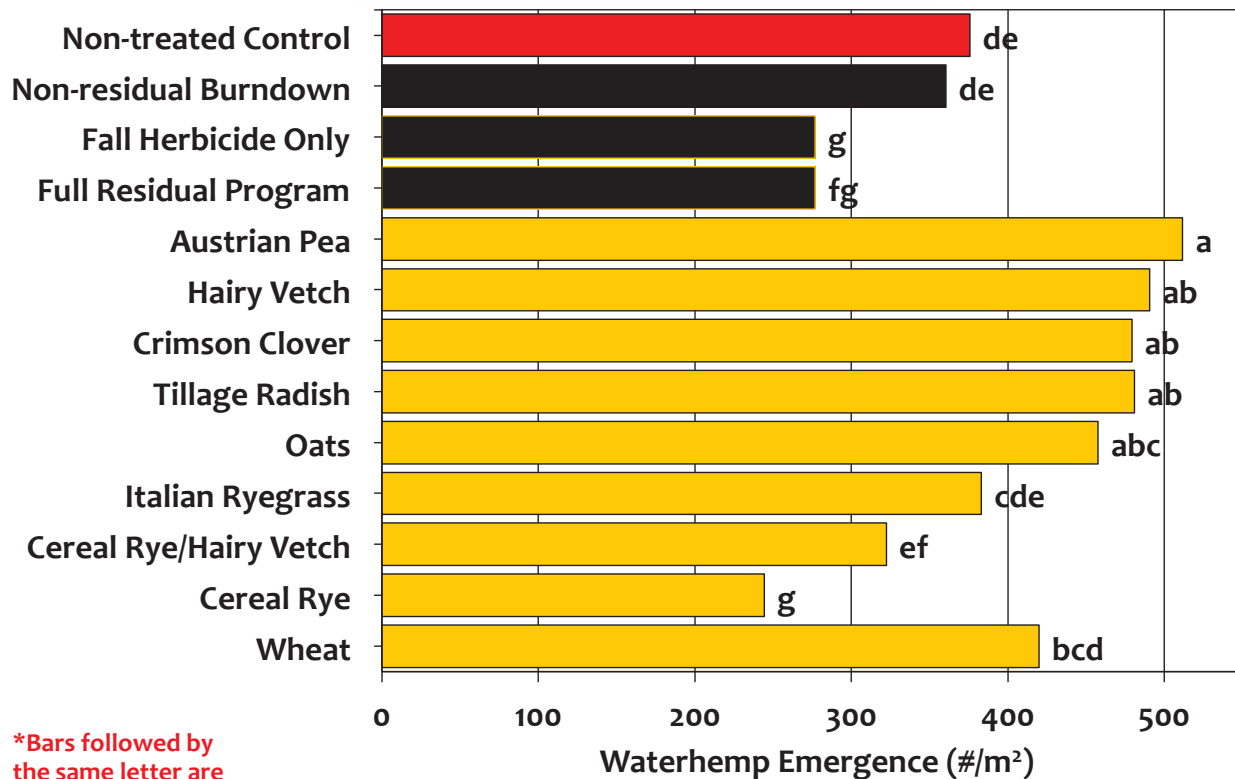
Consider what kind of summer annual weed control you can get out of cover crops that will winter kill.



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Influence of Cover Crops vs. Herbicide Treatments on Early Season Waterhemp Emergence

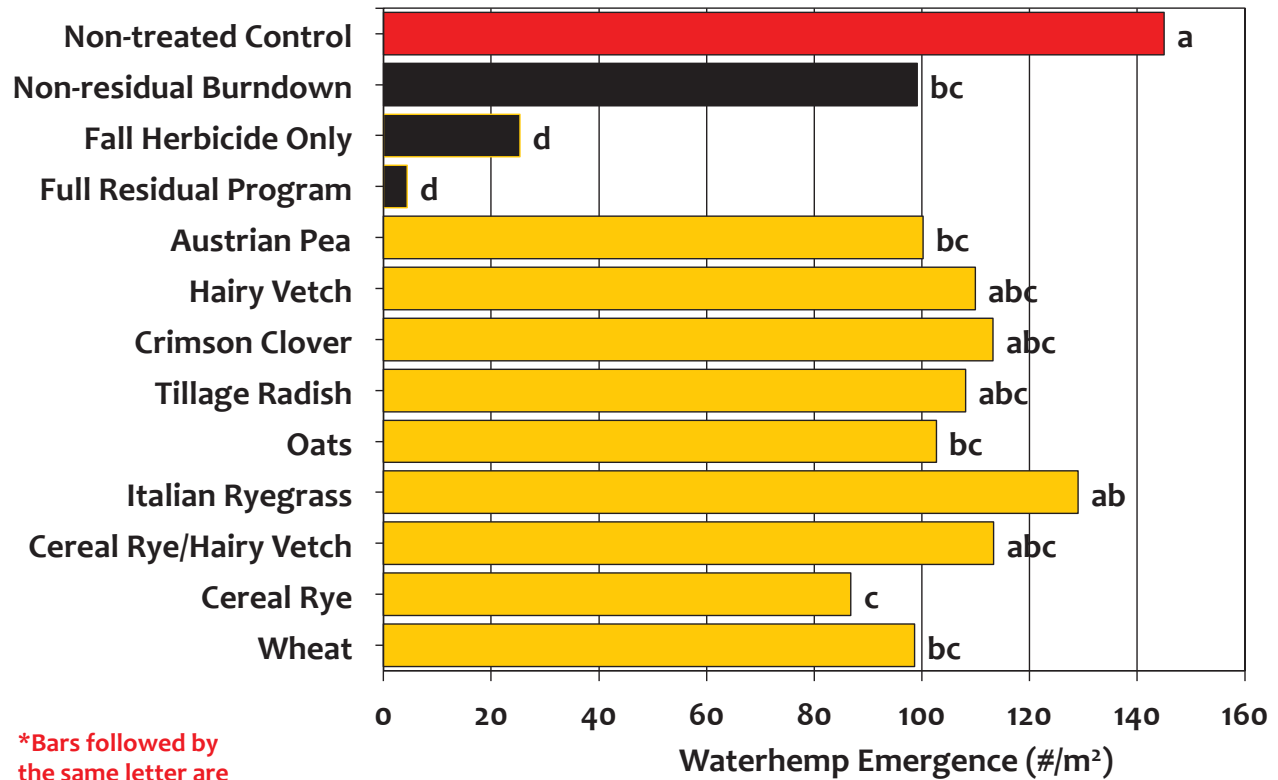
(results summarized across 9 site-years in Missouri)



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Influence of Cover Crops vs. Herbicide Treatments on Late Season Waterhemp Emergence

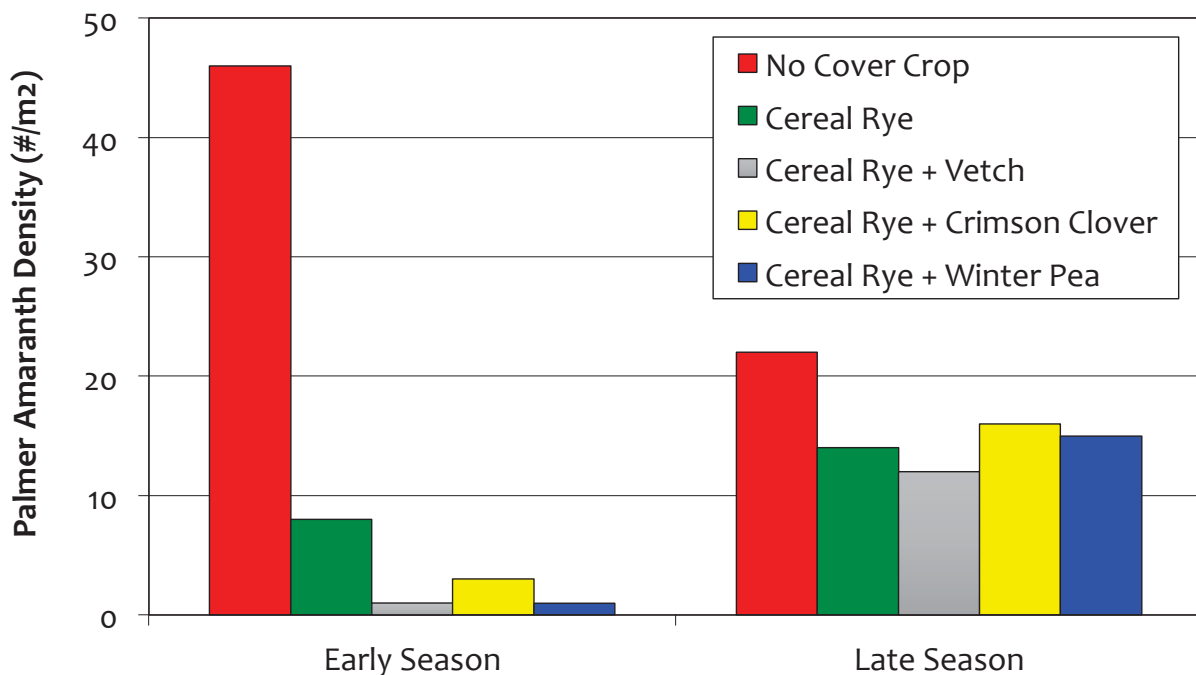
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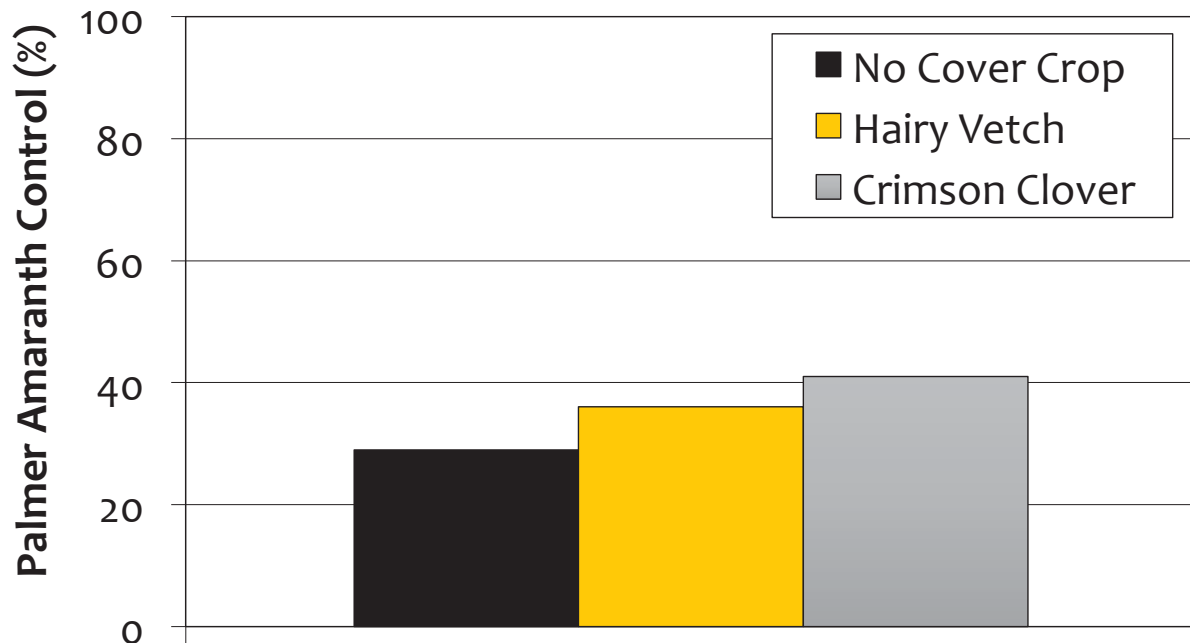
Cornelius and Bradley. 2017. Weed Technology.

Influence of Cover Crops on Palmer Amaranth Emergence in Georgia



Webster et al. 2013. Crop Protection 52:130-135.

Influence of Cover Crops on Palmer Amaranth Control Prior to Corn Planting



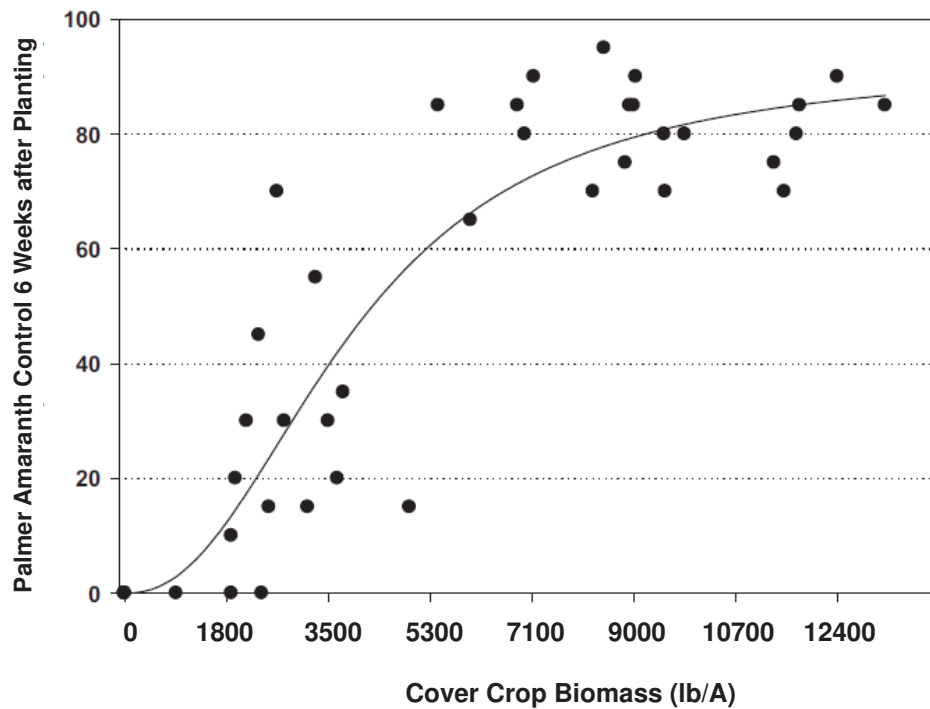
Wiggins et al. 2015. Weed Technology 29:412-418.

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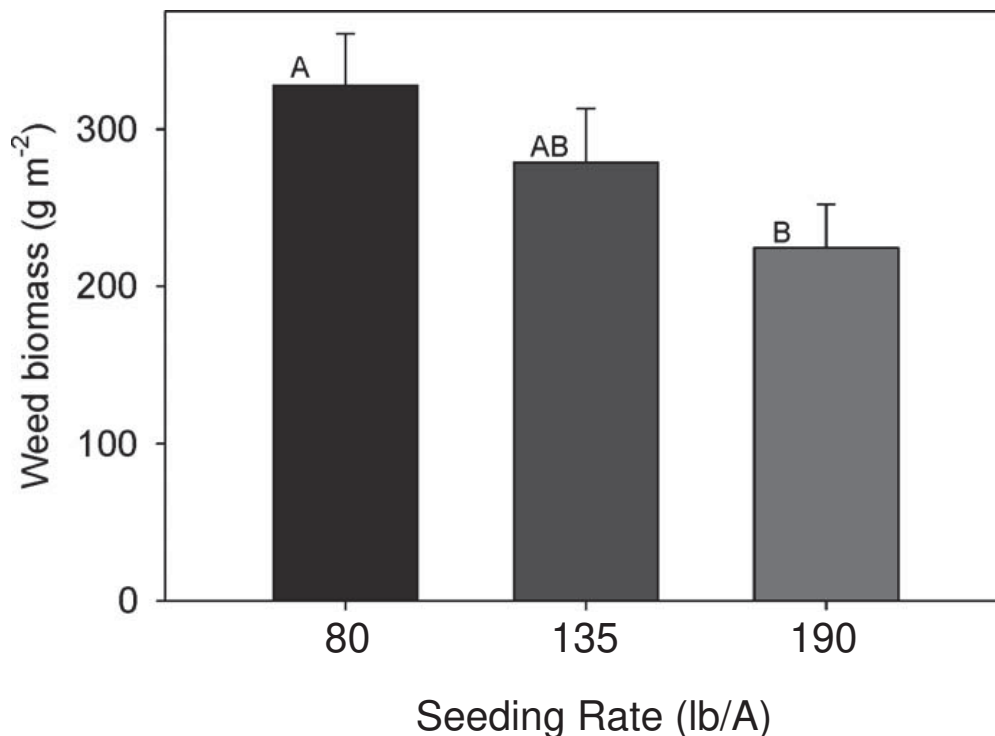
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Relationship Between Rolled Cover Crop Biomass and Pigweed Control After Planting



Webster et al. 2013. Crop Protection 52:130-135.

Influence of Cereal Rye Seeding Rate on Weed Biomass 10 Weeks after Cereal Rye Termination



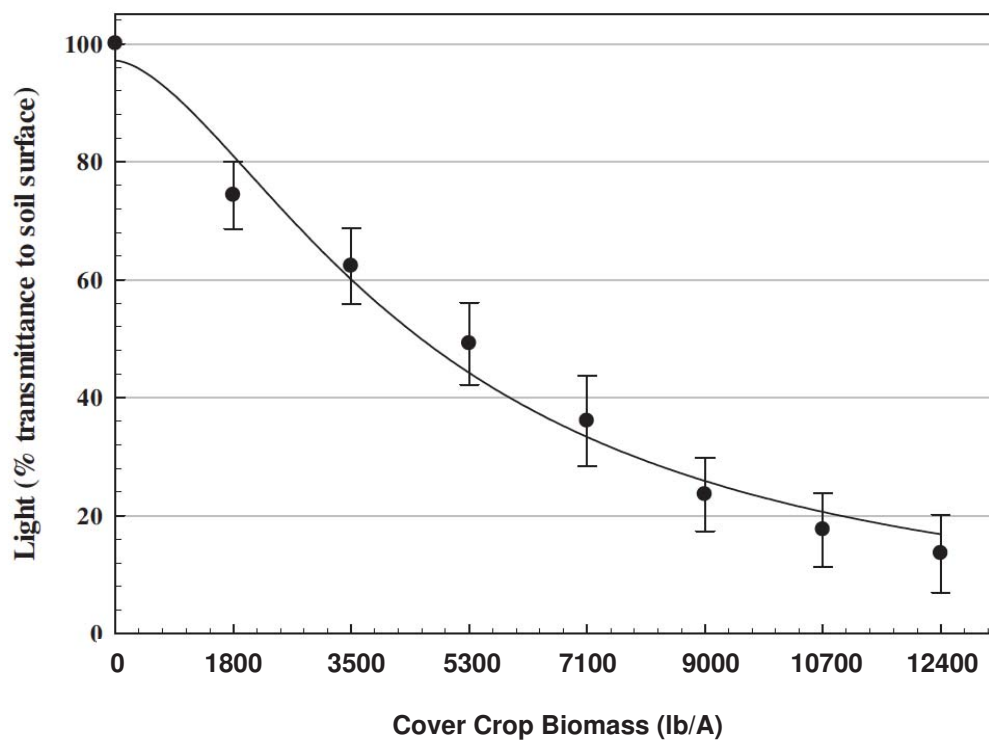
Mirsky et al. 2011. Weed Science 59:380-389.

Which situation will provides more opportunity for summer annual weed emergence?



Glyphosate + 2,4-D applied 14 days previous

Relationship Between Rye Residue Levels and the Amount of Sunlight Reaching the Soil Surface



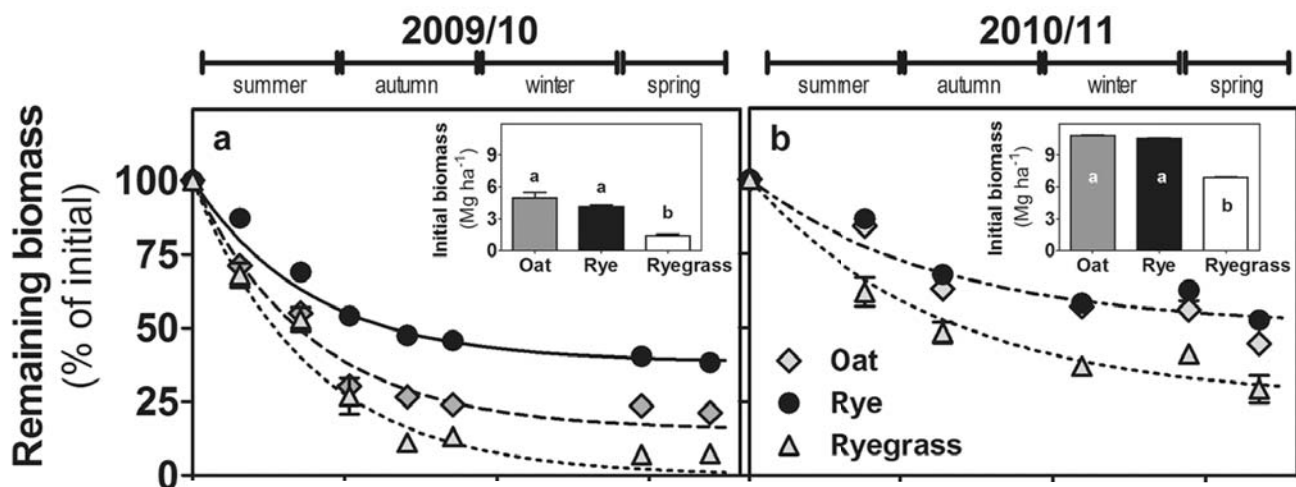
Webster et al. 2016. Field Crops Research 192:103-109.

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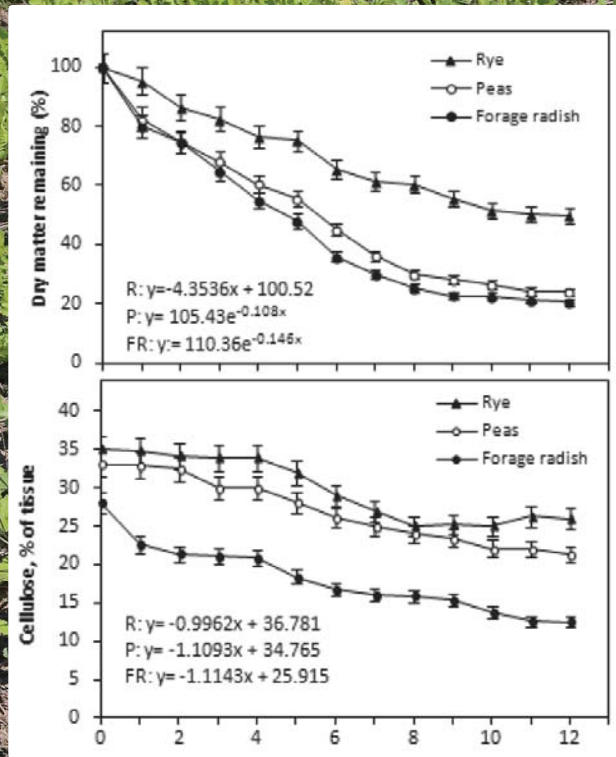
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The rate of cover crop decomposition will be directly related to the weed control you get...

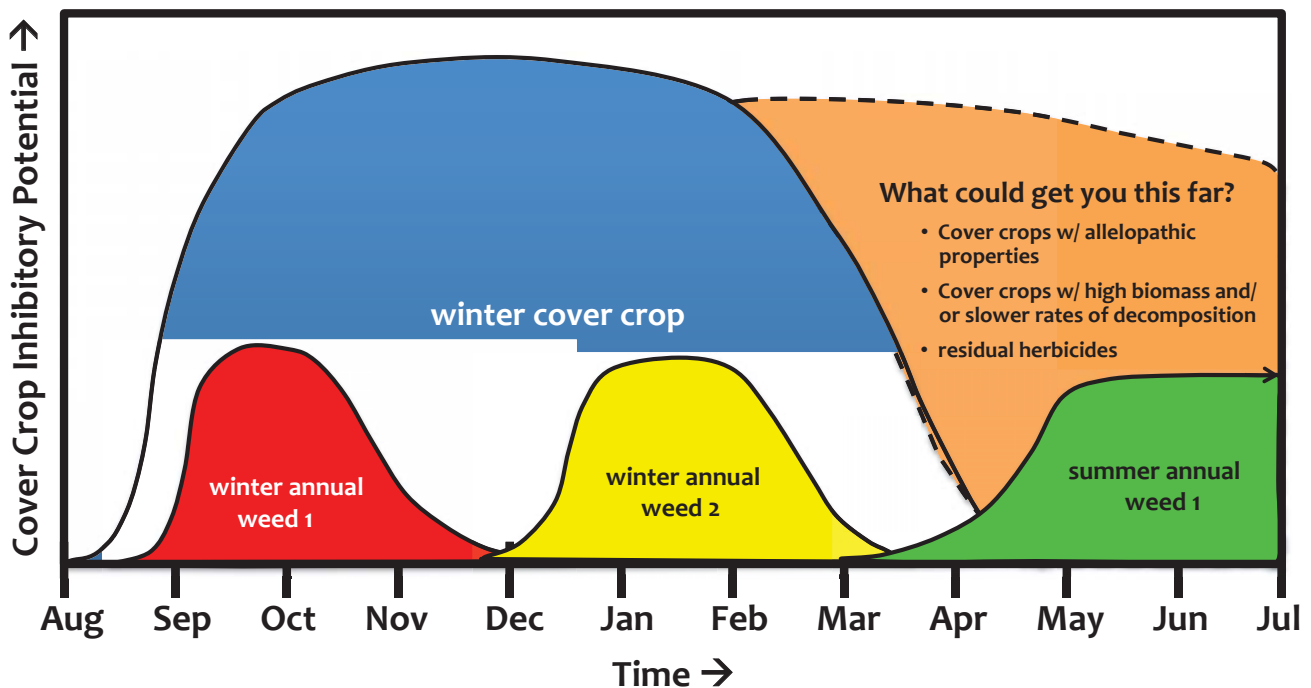


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Jahanzad et al. 2016. Agronomy Journal 108:1735-1741

Relationship Between Inhibitory Potential of Cover Crops and Various Weed Species



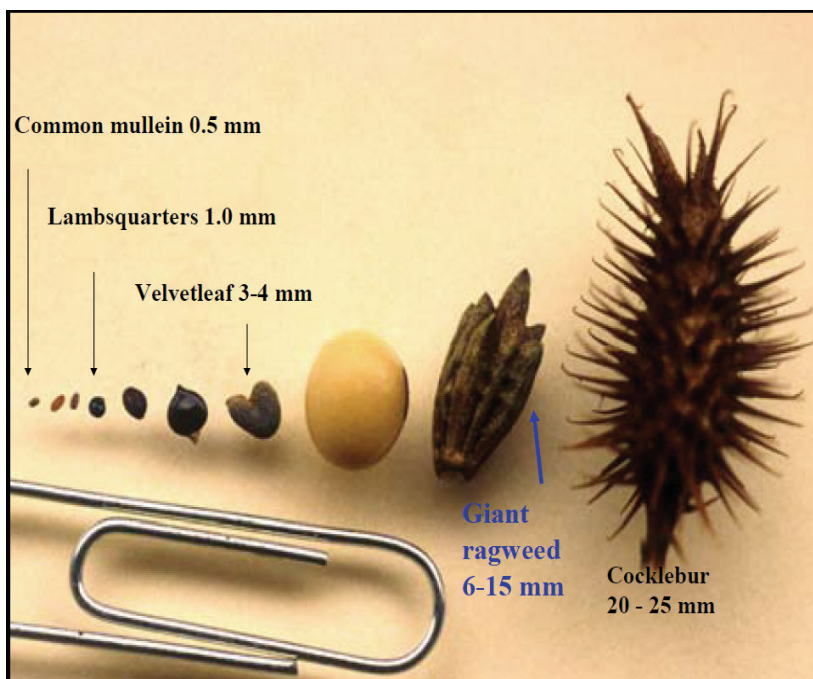
Adapted from Kruidhof et al. 2010. Weed Research 51:177-186.

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Different Weed Seeds are Affected Differently by:
soil cover, light, temperature, soil depth, etc.



- We have seen greater success of cover crops on small-seeded broadleaf weeds and grasses
- Much less on larger-seeded broadleaf weeds like cocklebur and giant ragweed

Mizzou® weed science

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