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

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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)



Cornelius and Bradley. 2017. Weed Technology.

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



\*Means followed by the same letter are not different.

Hayden et al. 2012. Weed Technology 26:818-825.

		covered by weeds		
Location	Field	Forage radish	No cover crop	Rye
			%	
		Late fall		
BARC-NF	Α	0Ь	40a	-
	В	0Ь	83a	-
	С	0Ь	24a	-
BARC-SF	D	0c	78a	-
	E	0c	94a	10Ь
	F	0Ь	96a	0Ь
	G	0Ь	94a	0Ь
CMREC	- I	0Ь	8a	0Ь
WREC	J	0Ь	47a	0Ь
	La	ate March		
BARC-NF	Α	0Ь	84a	_
	В	ІЬ	39a	-
	С	0Ь	7la	-
BARC-SF	E	0c	7la	7Ь
	F	3Ь	99a	Ь
	G	ІЬ	97a	0Ь
CMREC	Н	22Ь	53a	4c
	- I	0Ь	22a	0Ь
WREC	J	2Ь	55a	0Ь
	Typical tim	ne of corn pla	inting	
BARC-NF	Α	37c	95a	-
	В	19	_†	-
	С	ПЬ	87a	-
BARC-SF	E	3	-†	-†
	F	37ab	75a	0Ь
	G	11	-†	-†
CMREC	Н	63	_†	_†
	1	4	_†	_†

Percentage of ground

#### Influence of a Radish and Cereal Rye Cover Crop on Weed Groundcover across 9 Sites in Maryland

awley et al. 2011. Agronomy Journal 103:137-144.

+ 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 glyphosateresistant weeds in the U.S.

## Horseweed Life Cycle



#### Nandula 2006

Integration of a Cereal Rye Cover Crop for the Control of Glyphosateresistant Horseweed/Marestail



Based on our research and the results of other published studies, the ability of cover crops to reduce the emergence of 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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  Time of cover crop termination/rate of
- cover crop decay

Cover crop species selected

4. Type of weed species

### 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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### All cover crops should not be viewed equally...

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)



Non-treated Control Non-residual Burndown Fall Herbicide Only **Full Residual Program Crimson Clover** Tillage Radish **Italian Ryegrass Cereal Rye/Hairy Vetch** 

\*Bars followed by the same letter are not different, LSD<sub>0.05</sub>

Cornelius and Bradley. 2017. Weed Technology.

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

(results summarized across 9 site-years in Missouri)



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.

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

1. Cover crop species selected

3. Time of cover crop termination/rate of cover crop decay

Announc of cover crop blomass accumulated

4. Type of weed species

#### 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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3. Unite of cover drop dennine don/rakt of

4. Type of weed species

## 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.

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

1. Cover crop species selected

Lype of weed species

- 2. Amount of cover crop biomass accumulated
- 3. Time of cover crop termination/rate of cover crop decay

#### **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

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