

# **Cover crop and herbicide interactions**

Meaghan Anderson

# Terminology

- Cover crop
  - unharvested crop left as “green manure” to provide a benefit to the soil
- Forage crop
  - a crop of cultivated plants or plant parts, separated from grain, produced to be grazed or harvested for use as feed for animals  
(Crops Science Society of America)

# Residual herbicides

- Herbicide resistance has led to increased use and rates of residual herbicides
  - Provide several weeks of weed control, generally aimed at small-seeded broadleaves and grasses
- Many herbicides have sufficient longevity to affect cover crop establishment

# Label restrictions regarding cover crops

- Most not developed with cover crops in mind
  - Many cover crops not explicitly listed on label
- **Must be followed if there is any possibility of the cover crop being grazed or harvested for forage**

# Grazing cover crops

- Most labels have restrictions for the *planting* of the following crop
  - i.e. if you *plant* cereal rye during the restricted interval, you **cannot** harvest it for food or feed
- Aciflourfen (Ultra Blazer)
  - If you plan to graze a radish and small grain mixture, you must follow the longer rotation restriction of 100 days
  - June 16 aciflourfen application = Sept. 24 planting date **for grazing**

# The trend for labeling?

- Zidua: 18 months for all crops not specifically listed in table (no common cover crops in table)
- Dual II Magnum: Do not rotate to food or feed crops other than those listed below. For all crops not listed, wait at least 12 months
- Harness: Following harvest of food crops, only non-food or non-feed winter crops may be planted. Do not graze or harvest cover crops . . . for 18 months following the last application of Harness . . .

# Relative sensitivity of select cover crop species

- Greenhouse trials
- Herbicides applied at **0.12**, **0.25**, 0.38 and **0.5X** label rate
- 5 cover crop species
- Herbicides
  - 7 corn products
  - 4 soybean products



**Control**



**1.9 oz Hornet**



# Relative risk of several corn herbicides

Tradename	Rye	Oats	H. vetch	Lentil	Radish
atrazine	2	2	2	2	2
Dual II Mag	2	1	1	1	1
Balance Flexx	1	1	2	2	3
Callisto	1	1	1	2	2
Laudis	1	1	2	2	2
Corvus	2	2	2	2	3
Hornet	1	1	3	3	3

1 = little or no risk; 2 = potential injury depending upon rate and other factors;  
3 = high potential for injury affecting establishment

# Relative risk of several soybean herbicides

Tradename	Rye	Oats	H. vetch	Lentil	Radish
Classic	1	1	1	2	2
Pursuit	1	1	1	1	2
Prowl	2	2	1	1	1
Reflex	1	1	1	1	2

1 = little or no risk;

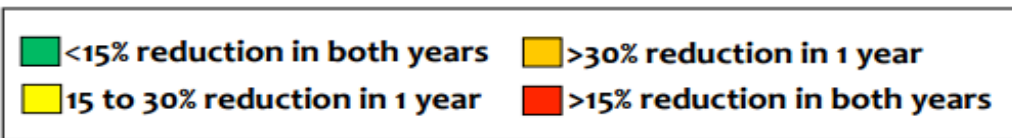
2 = potential injury depending upon rate and other factors;

3 = high potential for injury affecting establishment

# U. Of Missouri Research

- Field research with drilled cover crops
  - Herbicides applied in late June/early July; cover crops drilled Sept. 10
  - Biomass, stand measurements
- Found that environment plays a large role in the effect of herbicides on cover crop establishment
  - Increased rainfall in 2014 resulted in less injury to covers
  - Tillage radish was most sensitive crop tested

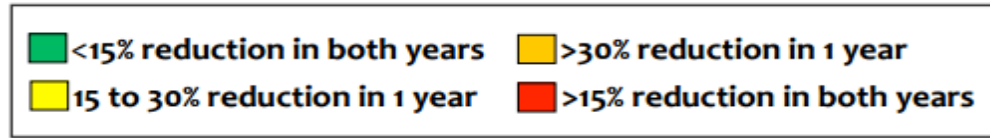
# Influence of Soybean Herbicide Treatments on Fall Cover Crop Stand (2013-2014)



Herbicide Treatment	Rate	Cover Crop Species							
		Winter Wheat	Tillage Radish	Cereal Rye	Crimson Clover	Winter Oat	Austrian Pea	Annual Ryegrass	Hairy Vetch
		-----% Stand Reduction relative to non-treated, 28 days after emergence-----							
Spartan	8 fl ozs	Green	Green	Green	Green	Green	Green	Green	Green
Valor	2.5 ozs	Green	Green	Green	Yellow	Green	Green	Yellow	Green
Sencor	0.5 lb	Yellow	Green	Yellow	Yellow	Yellow	Green	Green	Green
Authority First	6.4 ozs	Green	Yellow	Orange	Yellow	Green	Green	Green	Green
Classic	1.5 ozs	Yellow	Yellow	Green	Green	Green	Yellow	Yellow	Green
Flexstar	20 fl ozs	Green	Orange	Green	Yellow	Yellow	Green	Green	Green
Cobra	12.5 fl ozs	Green	Green	Green	Orange	Yellow	Green	Green	Green
Pursuit	4 fl ozs	Yellow	Orange	Green	Yellow	Yellow	Green	Green	Green
Firstrate	0.6 oz	Green	Green	Green	Yellow	Green	Yellow	Green	Green
Synchrony XP	0.375 oz	Green	Green	Green	Yellow	Green	Green	Yellow	Green
Dual II Magnum	1.33 pts	Green	Green	Yellow	Yellow	Green	Yellow	Yellow	Green
Warrant	1.5 qts	Green	Yellow	Green	Red	Yellow	Green	Orange	Green
Zidua	3 ozs	Green	Green	Yellow	Yellow	Red	Green	Orange	Green
Prefix	2 pts	Green	Red	Yellow	Red	Green	Green	Yellow	Yellow

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# Influence of Soybean Herbicide Treatments on Fall Cover Crop Biomass (2013-2014)



Herbicide Treatment	Rate	Cover Crop Species							
		Winter Wheat	Tillage Radish	Cereal Rye	Crimson Clover	Winter Oat	Austrian Pea	Annual Ryegrass	Hairy Vetch
	—product/A—	-----% biomass reduction relative to non-treated, 28 days after emergence-----							
Spartan	8 fl ozs	Yellow	Yellow	Green	Light Yellow	Light Yellow	Yellow	Light Yellow	Light Yellow
Valor	2.5 ozs	Light Yellow	Red	Light Yellow	Red	Light Yellow	Red	Light Yellow	Light Yellow
Sencor	0.5 lb	Yellow	Yellow	Light Yellow	Yellow	Green	Yellow	Light Yellow	Light Yellow
Authority First	6.4 ozs	Green	Red	Green	Light Yellow	Green	Red	Green	Green
Classic	1.5 ozs	Green	Yellow	Green	Red	Green	Yellow	Green	Green
Flexstar	20 fl ozs	Light Yellow	Red	Light Yellow	Light Yellow	Green	Red	Green	Green
Cobra	12.5 fl ozs	Green	Light Yellow	Light Yellow	Yellow	Green	Red	Light Yellow	Light Yellow
Pursuit	4 fl ozs	Yellow	Red	Light Yellow	Red	Light Yellow	Red	Light Yellow	Green
Firstrate	0.6 oz	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Green	Red	Green	Green
Synchrony XP	0.375 oz	Light Yellow	Light Yellow	Green	Red	Green	Light Yellow	Green	Green
Dual II Magnum	1.33 pts	Red	Light Yellow	Green	Yellow	Green	Red	Light Yellow	Green
Warrant	1.5 qts	Light Yellow	Green	Green	Green	Green	Red	Green	Green
Zidua	3 ozs	Red	Yellow	Red	Red	Green	Red	Yellow	Green
Prefix	2 pts	Red	Red	Yellow	Red	Green	Yellow	Red	Light Yellow

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# Influence of Corn Herbicide Treatments on Fall Cover Crop Stand (2013-2014)



Herbicide Treatment	Rate	Cover Crop Species							
		Winter Wheat	Tillage Radish	Cereal Rye	Crimson Clover	Winter Oat	Austrian Pea	Annual Ryegrass	Hairy Vetch
		-----% Stand Reduction relative to non-treated, 28 days after emergence-----							
Atrazine	2 qts	Green	Green	Green	Yellow	Red	Yellow	Green	Yellow
Callisto	3 fl ozs	Green	Yellow	Yellow	Green	Yellow	Yellow	Green	Green
Laudis	3 fl ozs	Green	Green	Yellow	Green	Green	Green	Green	Green
Impact	3/4 fl oz	Green	Green	Green	Green	Red	Yellow	Green	Green
Balance Flexx	5 fl ozs	Yellow	Yellow	Green	Green	Green	Green	Green	Green
Stinger	1/2 pt	Green	Yellow	Green	Orange	Red	Yellow	Green	Yellow
Python	1 oz	Yellow	Orange	Green	Green	Yellow	Green	Green	Green
Resolve	1 oz	Green	Yellow	Green	Green	Green	Green	Yellow	Green
Accent Q	0.9 oz	Red	Orange	Orange	Green	Red	Green	Green	Green
Surestart + Atra	1.75 pt + 1 qt	Green	Green	Green	Yellow	Green	Green	Green	Green
Halex GT + Atra	4 pt + 1 qt	Green	Green	Green	Green	Green	Yellow	Orange	Green
Capreno	3 fl ozs	Green	Green	Green	Green	Yellow	Green	Green	Yellow
Zidua	3 ozs	Yellow	Yellow	Yellow	Green	Orange	Green	Orange	Green

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# Influence of Corn Herbicide Treatments on Fall Cover Crop Biomass (2013-2014)



Herbicide Treatment	Rate	Cover Crop Species							
		Winter wheat	Tillage Radish	Cereal Rye	Crimson Clover	Winter Oat	Austrian Pea	Annual Ryegrass	Hairy Vetch
	--product/A--	-----% biomass reduction relative to non-treated, 28 days after emergence-----							
Atrazine	2 qts	Red	Yellow	Orange	Red	Yellow	Yellow	Orange	Green
Callisto	3 fl ozs	Red	Red	Red	Yellow	Green	Red	Yellow	Orange
Laudis	3 fl ozs	Red	Yellow	Orange	Red	Green	Yellow	Yellow	Green
Impact	3/4 fl oz	Red	Orange	Red	Yellow	Red	Yellow	Red	Yellow
Balance Flexx	5 fl ozs	Red	Orange	Red	Red	Red	Red	Red	Yellow
Stinger	1/2 pt	Red	Yellow	Red	Red	Red	Red	Red	Red
Python	1 oz	Red	Red	Red	Red	Yellow	Orange	Orange	Orange
Resolve	1 oz	Red	Red	Red	Red	Red	Green	Red	Yellow
Accent Q	0.9 oz	Red	Yellow	Red	Red	Red	Green	Orange	Yellow
Surestart + Atra	1.75 pt + 1 qt	Red	Red	Red	Orange	Red	Orange	Yellow	Orange
Halex GT + Atra	4 pt + 1 qt	Red	Red	Red	Red	Red	Orange	Red	Orange
Capreno	3 fl ozs	Red	Yellow	Yellow	Green	Green	Yellow	Orange	Yellow
Zidua	3 ozs	Red	Yellow	Red	Red	Red	Yellow	Orange	Green

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# Factors to consider

- Herbicide
  - Persistence (half life)
  - Rate applied
  - Application date
- Environment
  - Soil type
  - Rainfall after application
- Cover crop sensitivity
  - Planting date??
  - Cereal rye most tolerant
  - Radish most sensitive



# Questions and comments

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