

The Effects of Herbicide Carryover on Cover Crops

Objective

To determine which corn and soybean herbicides are most likely to carryover and cause injury to cover crop species.



Cover Crop Carryover Research - Methodology

General: Field experiments were conducted in 2013-2015 in Columbia, MO. Corn and soybean were planted in May/June. All herbicide programs tested were POST applications and applied in late June to early July.

Cover Crop Planting Dates: Sept. 10 or 11, 2013-2014

Seeding Rates (lb/A):

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



Influence of Soybean Herbicide Treatments on Fall Cover Crop Stand (2013-2015)

Mizzou weed science

■ No stand reduction in any year
 ■ Stand reduction in 1 of 3 years
 ■ Stand reduction in 2 of 3 years

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	Green	Green
Valor	2.5 ozs	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Sencor	0.5 lb	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Authority First	6.4 ozs	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Classic	1.5 ozs	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Flexstar	20 fl ozs	Green	Red	Green	Green	Green	Green	Green	Green	Green	Green
Cobra	12.5 fl ozs	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Pursuit	4 fl ozs	Green	Red	Green	Green	Green	Green	Green	Green	Green	Green
Firstrate	0.6 oz	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Synchrony XP	0.375 oz	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Dual II Magnum	1.33 pts	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Warrant	1.5 qts	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Zidua	3 ozs	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Prefix	2 pts	Green	Red	Green	Green	Green	Green	Green	Green	Green	Green

©Kevin Bradley, Univ. Missouri

Influence of Soybean Herbicide Treatments on Fall Cover Crop Biomass (2013-2015)

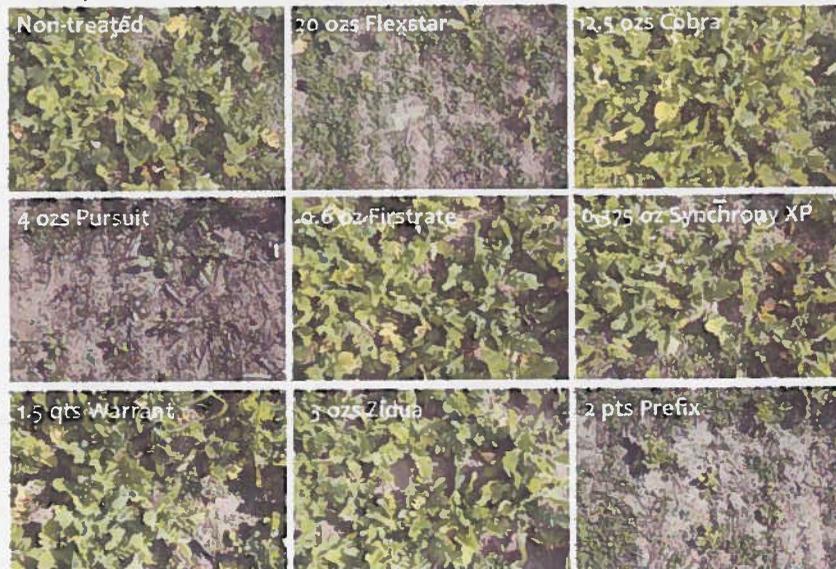
Mizzou weed science

■ No biomass reduction in any year
 ■ Biomass reduction in 1 of 3 years
 ■ Biomass reduction in 2 of 3 years

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

©Kevin Bradley, Univ. Missouri

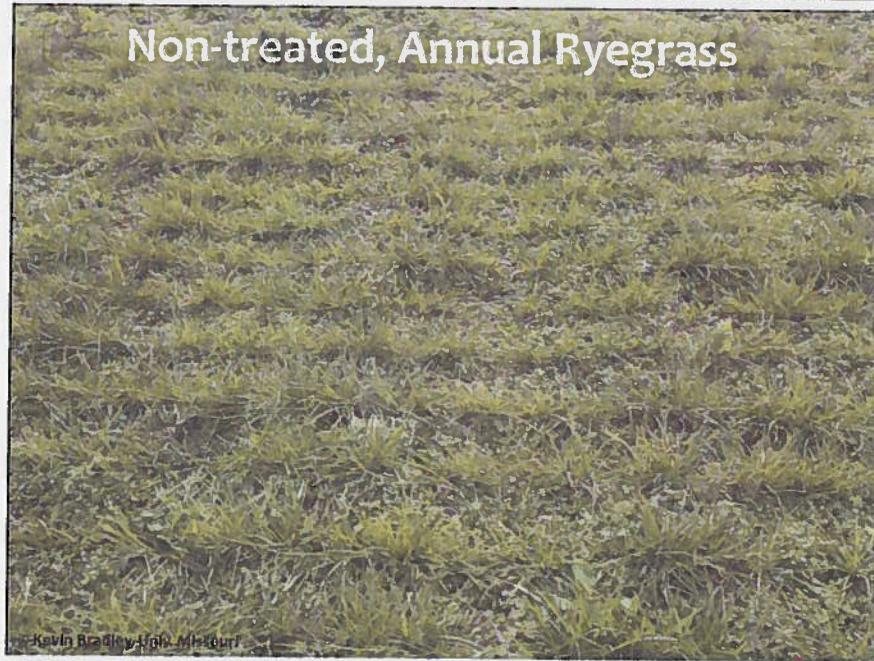
Carryover of POST Soybean Treatments to Tillage Radish



Carryover of POST Soybean Treatments to Cereal Rye

Non-treated	20 ozs Flexstar	12.5 ozs Cobra
4 ozs Pursuit	0.6 oz Firstrate	0.375 oz Synchrony XP
1.5 qts Warrant	3 ozs Zidua	2 pts PreMix

Non-treated, Annual Ryegrass



3 ozs Zidua, Annual Ryegrass



Influence of Corn Herbicide Treatments on Fall Cover Crop Stand (2013-2015)

Mizzou
weed science

■ No stand reduction in any year ■ Stand reduction in 1 of 3 years ■ Stand reduction in 2 of 3 years

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

©Kevin Bradley, Univ. Missouri

Influence of Corn Herbicide Treatments on Fall Cover Crop Biomass (2013-2015)

Mizzou
weed science

■ No biomass reduction in any year ■ Biomass reduction in 1 of 3 years ■ Biomass reduction in 2 of 3 years

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	■	■	■	■	■	■	■	■
Callisto	3 fl ozs	■	■	■	■	■	■	■	■
Laudis	3 fl ozs	■	■	■	■	■	■	■	■
Impact	3/4 fl oz	■	■	■	■	■	■	■	■
Balance Flexx	5 fl ozs	■	■	■	■	■	■	■	■
Stinger	1/4 pt	■	■	■	■	■	■	■	■
Python	1 oz	■	■	■	■	■	■	■	■
Resolve	1 oz	■	■	■	■	■	■	■	■
Accent Q	0.9 oz	■	■	■	■	■	■	■	■
Surestart + Atrazine	1.75 pt + 1 qt	■	■	■	■	■	■	■	■
Halex GT + Atrazine	4 pt + 1 qt	■	■	■	■	■	■	■	■
Capreno	3 fl ozs	■	■	■	■	■	■	■	■
Zidua	3 ozs	■	■	■	■	■	■	■	■

©Kevin Bradley, Univ. Missouri

Conclusions

Herbicide carryover injury on cover crop species is going to vary from year to year, largely due to rainfall and time of application

The general order of sensitivity of cover crops to herbicide carryover, from greatest to least sensitive: tillage radish > Austrian winter pea > crimson clover = annual ryegrass > winter wheat = winter oats > hairy vetch = cereal rye

Soybean herbicide treatments that were most injurious to cover crops: fomesafen (Flexstar/Prefix), pyroxasulfone (Zidua), imazethapyr (Pursuit), acetochlor (Warrant), sulfentrazone (Authority products)

Corn herbicide treatments that were most injurious to cover crops: topramezone (Impact), mesotrione (Callisto, Halex GT, etc.) clocyralid (Stinger, SureStart), isoxaflutole (Balance Flexx), pyroxasulfone (Zidua, etc.), nicosulfuron (Accent Q, etc.),