# 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 <u>any possibility</u> 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)

- <15% reduction in both years
- >30% reduction in 1 year
- 15 to 30% reduction in 1 year
- >15% reduction in both 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---------- | | | | | | | |
| Spartan | 8 fl ozs | | | | | | | | |
| Valor | 2.5 ozs | | | | | | | | |
| Sencor | 0.5 lb | | | | | | | | |
| Authority First | 6.4 ozs | | | | | | | | |
| Classic | 1.5 ozs | | | | | | | | |
| Flexstar | 20 fl ozs | | | | | | | | |
| Cobra | 12.5 fl ozs | | | | | | | | |
| Pursuit | 4 fl ozs | | | | | | | | |
| Firstrate | 0.6 oz | | | | | | | | |
| Synchrony XP | 0.375 oz | | | | | | | | |
| Dual II Magnum | 1.33 pts | | | | | | | | |
| Warrant | 1.5 qts | | | | | | | | |
| Zidua | 3 ozs | | | | | | | | |
| Prefix | 2 pts | | | | | | | | |

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

- <15% reduction in both years
- >30% reduction in 1 year
- 15 to 30% reduction in 1 year
- >15% reduction in both 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-------- | | | | | | | |
| Spartan | 8 fl ozs | | | | | | | | |
| Valor | 2.5 ozs | | | | | | | | |
| Sencor | 0.5 lb | | | | | | | | |
| Authority First | 6.4 ozs | | | | | | | | |
| Classic | 1.5 ozs | | | | | | | | |
| Flexstar | 20 fl ozs | | | | | | | | |
| Cobra | 12.5 fl ozs | | | | | | | | |
| Pursuit | 4 fl ozs | | | | | | | | |
| Firstrate | 0.6 oz | | | | | | | | |
| Synchrony XP | 0.375 oz | | | | | | | | |
| Dual II Magnum | 1.33 pts | | | | | | | | |
| Warrant | 1.5 qts | | | | | | | | |
| Zidua | 3 ozs | | | | | | | | |
| Prefix | 2 pts | | | | | | | | |

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

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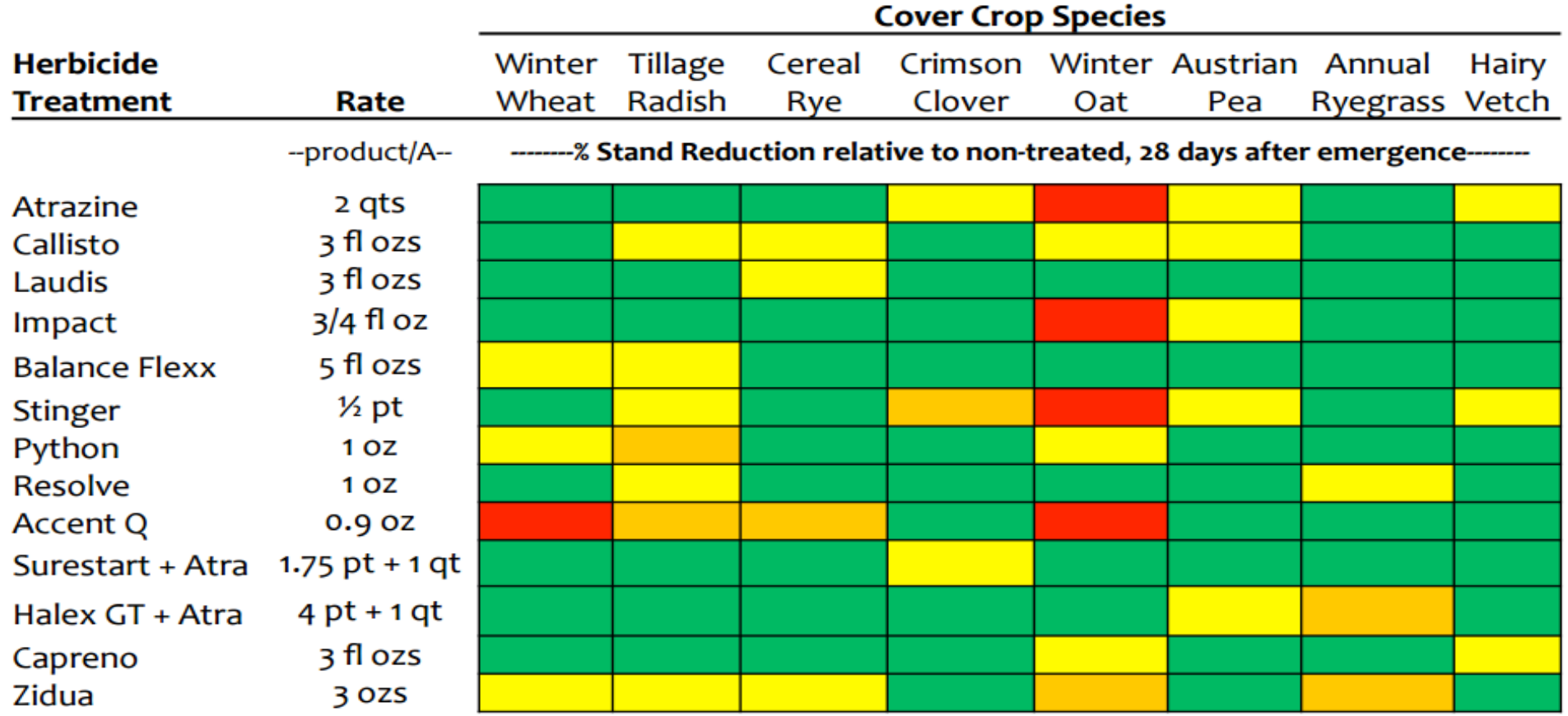

# Influence of Corn Herbicide Treatments on Fall Cover Crop Biomass (2013-2014)

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| Herbicide Treatment | Rate | Winter wheat | Tillage Radish | Cereal Rye | Crimson Clover | Winter Oat | Austrian Pea | Annual Ryegrass | Hairy Vetch |
|---|---|---|---|---|---|---|---|---|---|
| | | Cover Crop Species | | | | | | | |
| | --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 | ½ pt | | | | | | | | |
| Python | 1 oz | | | | | | | | |
| Resolve | 1 oz | | | | | | | | |
| Accent Q | 0.9 oz | | | | | | | | |
| Surestart + Atra | 1.75 pt + 1 qt | | | | | | | | |
| Halex GT + Atra | 4 pt + 1 qt | | | | | | | | |
| Capreno | 3 fl ozs | | | | | | | | |
| Zidua | 3 ozs | | | | | | | | |

# 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

Meaghan Anderson
ISUEO Field Agronomist
3109 Old Highway 218 S.
Iowa City, IA 52246
mjanders@iastate.edu
O: 319-337-2145  C: 319-331-0058