

COVER CROPS

Selecting the right fit for my production system

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A general expectation of planting the cover crops over time is to

Improve soil quality, or how well a soil can perform what we want it to do. Influencers affecting soil function improvement are:

- **Biological factors**
- **Organic matter**

With a goal of

- ❖ **Improving yields**
- ❖ **Increase economic returns**
- ❖ **Improve crop quality**
- ❖ **Reducing nutrient loss via leaching or erosion**



The ultimate expectation of planting cover crops over time is to

Enhance soil health or the *state of a soil meeting its range of ecosystem functions as appropriate to its environment.*

- **Maintenance or improved biodiversity**
- **Water quality**
- **Nutrient cycling**
- **Biomass production**



What crop did I plant the past year?

What tillage system are you using?

What weed issues did I have this year?

Do I plan to apply fall herbicides this year?

Did I have disease issues in the previous crop?

What herbicides may still be present?

If I plant a cover crop...what is the reason?



Groundwater
Water bodies
Air Quality

IF YOU DECIDE TO INTEGRATE COVER CROPS IN YOUR PRODUCTION SYSTEM

Start small on manageable acreage

Small, irregular fields prone to erosion, nitrogen leaching, etc.

Selecting species:

- ❖ Your current and subsequent crop
- ❖ Best suited for your goals
- ❖ Adapted to your region and soils
- ❖ Adapted to your tillage system
- ❖ How will it be planted and terminated
- ❖ Have fast is germination and emergence (competitive)
- ❖ Are easily terminated at recommended time
- ❖ Manageable residue based on your resources
- ❖ Most beneficial to soil fertility
- ❖ Economical



Mono-species or Multi-species?

- ❖ You can find research to support both
- ❖ Your decision based on your operation
- ❖ May be best starting simple with 1 or 2 species
- ❖ Don't expect a silver bullet that will fix everything !!

| Species | Nitrogen Source | Weed Suppression | Erosion Control | Subsoiler | Quick Growth | Forage | N Scavenger | Residue Persist. | Insect Nemat. Issues | Crop Disease | Allelop. |
|----------------|-----------------|------------------|-----------------|-----------|--------------|--------|-------------|------------------|----------------------|--------------|----------|
| Hairy Vetch | E | G | G | G | F | G | F | F | MIN | NO | G |
| Crimson Clover | E | VG | VG | F | G | E | G | G | YES | MIN | F |
| Subt. Clover | E | E | VG | P | G | VG | F | VG | YES | MIN | VG |
| Red Clover | E | VG | G | VG | F | E | G | F | MOD | MIN | G |
| Berseem Clover | E | E | VG | F | E | E | VG | G | MIN | MIN | F |
| Winter Peas | E | G | VG | F | VG | VG | F | F | MIN | MOD | F |
| Oats | | E | VG | P | E | G | VG | G | MIN | MIN | VG |
| Rye | | E | E | F | E | G | E | E | MIN | MIN | E |
| Wheat | | VG | VG | G | VG | VG | VG | VG | MOD | MOD | F |
| Radish | | E | VG | E | VG | G | E | F | MIN | NO | VG |
| S-Sudan | | VG | E | E | E | VG | E | VG | MIN | NO | E |

So.....Which covers best fit my objectives

Erosion Control

Cereal Rye
Oats
Wheat
Mustards
Berseem Clover
Radish

Weed Suppression

Cereal Rye
Oats
Wheat
Mustards
Rapeseed
Radish
Berseem Clover
Crimson Clover
Subterranean Cl
Sweet Clover
White Clover

Organic Matter

Cereal Rye
Wheat
Mustards
Radish
Hairy Vetch
Red Clover
Subterranean Cl
Berseem Clover
Crimson Clover
Sweet Clover

N Scavenger

Cereal Rye
Wheat
Oats
Radish
Rapeseed
Berseem Clover

Soil Compaction

Radish
Red Clover
Sweet Clover

Cover Crop Tolerance to Commonly Used Herbicides in Corn and Soybeans

| Herbicide | Group No. | 1X Rate | Cereal rye | Oat | Hairy vetch | Lentil | Radish |
|-------------------------|-----------|-----------|--------------------------------------|-----|-------------|--------|--------|
| Corn products | | | Injury Potential ¹ | | | | |
| Atrazine 90DF | 5 | 1.1 lb | 2 | 2 | 2 | 2 | 2 |
| Dual II Magnum | 15 | 1.5 pt | 2 | 1 | 1 | 1 | 1 |
| Balance Flexx | 27 | 5 fl oz | 1 | 1 | 2 | 2 | 3 |
| Callisto | 27 | 3 fl oz | 1 | 1 | 1 | 2 | 2 |
| Laudis | 27 | 3 fl oz | 1 | 1 | 2 | 2 | 2 |
| Corvus | 2, 27 | 5.6 fl oz | 2 | 2 | 2 | 2 | 3 |
| Hornet WDG | 2, 4 | 5 oz | 1 | 1 | 3 | 3 | 3 |
| Soybean products | | | | | | | |
| Classic | 2 | 1 oz | 1 | 1 | 1 | 1 | 2 |
| Pursuit | 2 | 4 fl oz | 1 | 1 | 1 | 1 | 2 |
| Prowl H2O | 3 | 3 pt | 2 | 2 | 1 | 1 | 1 |
| Reflex | 14 | 1.25 pt | 1 | 1 | 1 | 1 | 2 |

¹Injury Potential: 1 = little or no risk; 2 = some risk depending upon herbicide rate and environmental factors; 3 = high potential for injury affecting cover crop establishment

Hartzler, Bob. (n.d.), Effect of residual herbicides on cover crop establishment. Iowa State University Extension and Outreach. <https://crops.extension.iastate.edu/encyclopedia/effect-residual-herbicides-cover-crop-establishment>

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



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

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



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

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



■ 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----- | | | | | | | | | |
| Atrazine | 2 qts | Green | Green | Green | Green | Green | Green | Green | Green |
| Callisto | 3 fl ozs | Green | Green | Green | Green | Green | Green | Green | Green |
| Laudis | 3 fl ozs | Green | Green | Green | Green | Green | Green | Green | Green |
| Impact | 3/4 fl oz | Green | Green | Green | Red | Yellow | Green | Green | Green |
| Balance Flexx | 5 fl ozs | Green | Yellow | Green | Green | Yellow | Green | Green | Green |
| Stinger | 1/2 pt | Green | Green | Green | Green | Green | Green | Green | Green |
| Python | 1 oz | Green | Yellow | Green | Green | Green | Green | Yellow | Green |
| Resolve | 1 oz | Green | Green | Green | Green | Green | Green | Yellow | Green |
| Accent Q | 0.9 oz | Red | Yellow | Green | Green | Green | Green | Green | Green |
| Surestart + Atra | 1.75 pt + 1 qt | Green | Green | Green | Green | Green | Green | Green | Green |
| Halex GT + Atra | 4 pt + 1 qt | Green | Green | Green | Yellow | Green | Red | Yellow | Green |
| Capreno | 3 fl ozs | Green | Green | Green | Green | Green | Green | Green | Green |
| Zidua | 3 ozs | Green | Green | Green | Yellow | Green | Red | Green | Green |

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



■ 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----- | | | | | | | | | |
| Atrazine | 2 qts | Yellow | Green | Green | Red | Green | Green | Yellow | Green |
| Callisto | 3 fl ozs | Green | Green | Green | Green | Green | Yellow | Green | Yellow |
| Laudis | 3 fl ozs | Yellow | Yellow | Green | Yellow | Green | Green | Green | Green |
| Impact | 3/4 fl oz | Red | Yellow | Green | Green | Red | Green | Red | Green |
| Balance Flexx | 5 fl ozs | Green | Red | Green | Yellow | Green | Green | Green | Green |
| Stinger | 1/2 pt | Green | Green | Green | Red | Green | Green | Green | Green |
| Python | 1 oz | Green | Green | Green | Green | Green | Green | Yellow | Green |
| Resolve | 1 oz | Green | Red | Green | Green | Green | Green | Red | Green |
| Accent Q | 0.9 oz | Red | Red | Green | Yellow | Green | Green | Yellow | Green |
| Surestart + Atra | 1.75 pt + 1 qt | Yellow | Green | Green | Green | Green | Green | Yellow | Green |
| Halex GT + Atra | 4 pt + 1 qt | Green | Yellow | Green | Red | Yellow | Red | Red | Yellow |
| Capreno | 3 fl ozs | Green | Green | Green | Green | Green | Green | Yellow | Green |
| Zidua | 3 ozs | Yellow | Green | Green | Yellow | Yellow | Green | Red | Green |

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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.) clopyralid (Stinger, SureStart), isoxaflutole (Balance Flexx), pyroxasulfone (Zidua, etc.), nicosulfuron (Accent Q, etc.),**

COVER CROP COSTS CALCULATOR

Select dropdown values from **PURPLE** cells

Enter your input values in **YELLOW** cells;

Default values in **GREEN** cells can be used

Cover Crop Production Cost Estimator

| | CC1 | CC2 | CC3 | CC4 |
|---|----------------|------|------|-----------------------------|
| | Cereal Rye | None | None | None |
| What cover crop do you like to use | | | | |
| Farmer preferred seeding rate, lbs/acre | 20 | 0 | 0 | 0 |
| Price/lb (For Research ONLY) | 0.46 | 0.00 | 0.00 | 0.00 |
| Price/lb; YOUR LOCAL DEALER | 0.00 | 0.00 | 0.00 | 0.00 |
| Planting Method (Select One) | Drill | | | |
| Planting Machinery Costs, \$/acre | -- | 5 | | |
| Would you like to fertilize cover crops | Fertilize | | | |
| Fertilization costs, \$/acre | -- | 5 | | |
| How would you terminate the cover crops | Mowing/Rolling | | | |
| Labor costs, \$/hr | \$ 10.00 | | | |
| Labor Hrs | 0.0 | | | |
| | | | | Total Costs, \$/acre |
| | | | | \$23.34 |

NRCS Cover Crop and Tillage Decision Tool

| | | |
|--|--------------|---|
| Do you plan to grow single species or multiple species of cover crops (Select one) | Single | NRCS Incentive Payment; \$/acre/year |
| Is the Cover Crop practice you selected above an <i>existing practice</i> or a <i>new practice</i> on those fields | New | |
| Type of Tillage you want to adopt on the fields with cover crops (select one) | Reduced Till | |
| Is the tillage practice you selected above an <i>existing practice</i> or a <i>new practice</i> on those fields | New | |
| Net cost to farmer if NRCS incentives are used | | \$/acre |
| | | -\$42.66 |

Cover Crop Decision Tool

Naveen Adusumilli, Hendrix, James, Copes, Josh | 1/23/2019 3:53:28 PM



Cover Crop Information Sheets

- [Fall or Winter Planted Cover Crops](#)
- [Spring or Summer Planted Cover Crops](#)

Fall or Winter Planted Cover Crops

Small Grains

- [Annual ryegrass](#)
- [Black oats](#)
- [Cereal rye](#)
- [Oats](#)
- [Triticale](#)
- [Wheat](#)

Legumes

- [Balansa clover](#)
- [Crimson clover](#)
- [Blue lupin](#)
- [White lupin](#)
- [Common vetch](#)
- [Hairy vetch](#)
- [Austrian winter peas](#)



COASTAL PLAIN SECTION NAVIGATION

[Cover Crop Selection Tool](#)

[Planting and Managing Cover Crops](#)

[Seed Sources](#)

[Terminating Cover Crops](#)

[Planting Cash Crops in Cover Crop Residue](#)

[Equipment Rental](#)

[Local Experts](#)

[Financial Assistance](#)

[Additional Resources](#)

REMEMBER....

- **Legumes:** Most N fixation takes place in early to late spring growth; however late termination can result in higher C:N ratios and result in less immediate N for following crop.
- **Cereals:** Nutrient uptake is most during late-tillering and around jointing.
- **Brassicas:** Nutrient uptake is during early season growth. Early leaf shedding indicates stress and release of N during this time can be lost to leaching.

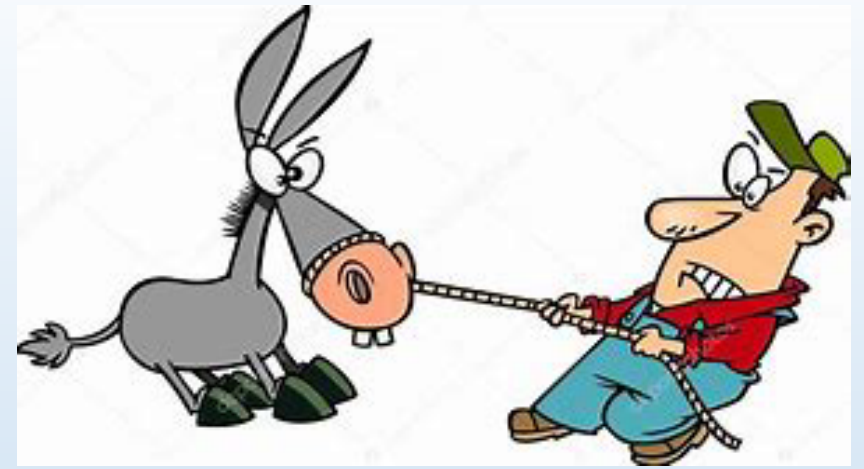
KEEP IN MIND.....

Cover crops have shifted from winter growth to spring growth.

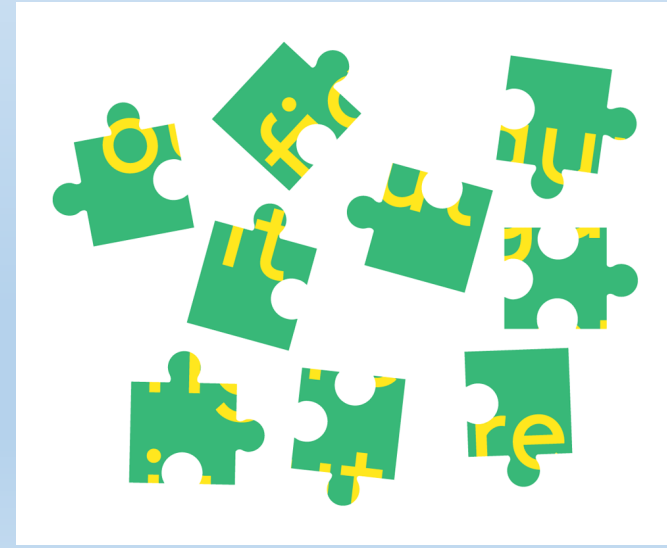
Initiate your spring management of cover crops based on intended purpose, cover crop planted and successive crop.

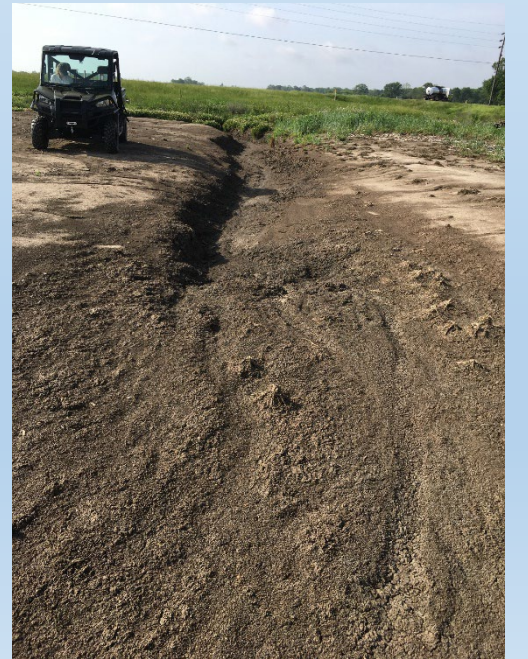
- ❖ Scout your cover crops for insect pests/beneficials to maximize benefits/reduce risks.
- ❖ For the 2024 corn crop, termination can begin in early February. If a beginner, terminate cereals at less than 10-12” before corn planting.
- ❖ Soybeans and Cotton:
 - Difficult cover crops to terminate (reproductive legumes or *Brassicas*) should be terminated or in progress.
 - Cover crops that are easy to terminate (cereals and vegetative legumes) should be terminated to allow for two to four weeks of non-actively growing cover crops.

ISSUES



- ❖ **Costs associated with seed, equipment and planting**
- ❖ **Timing of planting due to harvest of cash crops**
- ❖ **Establishment or injury due to herbicide persistence**
- ❖ **Can immobilize nitrogen for following cash crop**
- ❖ **Disease and insect problems due to green bridge**
- ❖ **Cooler and slower drying of soil**
- ❖ **Excess moisture post termination**
- ❖ **Allelopathy**
- ❖ **Incorporation with equipment difficult**











JHCC TERMINATION TIMING





03/02/2023



03/02/2023



03/02/2023



03/02/2023

