

# GUIDE SHEET: Using a Cover Crop **Before Corn**

(in an Iowa corn-soybean rotation)

## Introduction

Planting cover crops to enhance a corn-soybean rotation has many short and long-term benefits. To maximize benefits, cover crops need to be planted for several years. Implemented correctly, cover crops can improve soil health and crop health.

Cover crops need to be managed as part of the rotation. Plant timing and termination is crucial for successful implementation. Soil health is a primary benefit of cover crops.



## Species Selection

### Winter Kill Species (Broadleaves & Oats)

- » Oats - easy to establish, more difficult to aerial apply
- » Brassicas, Mustards, etc.

### Benefits of Broadleaf Cover Crops

- » Provides partial benefits without yield drag or the need to change management
- » Rotational Benefit (*grass following broadleaves*)
- » C:N ratio is low (< than 20) – Nitrogen not tied up by microbes
- » Scavenge N, legumes need >6" to fix N
  - *Don't inoculate unless planted by August 15*
- » Most winter kill, some will overwinter with enough fall growth and snow cover, *i.e. rape, crimson clover*
- » Easy to No-till into

### Challenges of Broadleaf Cover Crops

- » Hard to get much growth

- » Residual herbicide carryover can kill or stunt cover crop growth. (*Scout for germination and death.*)
- » Legumes have limited success due to slow establishment/growth in a typical corn-soybean system.

### Winter Hardy Grains (Cereal Rye, Wheat, Triticale)

#### Benefits of Winter Hardy Cover Crops

- » Weed control
- » Reduce compaction
- » Build soil structure
- » Food for microbes
- » Uptake residual nitrogen

#### Challenges of Winter Hardy Grains

- » Corn after a grass
- » High C:N ratio if not terminated early (6-8")
- » Potential tie up of nitrogen. Young corn plant needs N.
  - Planter applied: 50–70 lbs. N, or dribble over the row (*potential for root burning on contour*)
  - UAN (35 lbs.) *with pre-emergent herbicide, higher likelihood to be tied up by microbes when broadcasting*
- » Potential disease issues to young corn plant, *i.e. pythium*

## Fields to Target

- » Residual nitrate uptake, reduce off-site loss in tile by 31%.
- » Low O.M soils, high clay soils, eroded farms
- » Compacted areas
- » Soil erosion concerns
- » Fall-applied manured fields

## Scout for Early Stand Development Issues

- » Potential for uneven early corn growth. This may be due to nitrogen, seedling disease, & planter performance.
- » Scout early for insect issues, post-emergence.
  - Increased risk for black cut worm & army worm. Can be managed by post insecticide if economic threshold is met.

## Application

- » Broadcast on standing soybeans after leaf color change (10-20%) – **Best option when using broadleaves**
- Need the extra growing days
- Typical coverage 75-85% with aerial (*High-boy is better*)
- Poor stands if rainfall not adequate to get cover crop started
- Increased insect and earthworm predation on the seed beyond 10 days
- Aerial application can result in seeding neighbor's land
- 30" soybean rows vs. narrow rows allows more light and higher success
- » Drill after harvest
  - Only option is winter hardy grains
  - Only cereal rye for late plantings

## Termination

- » General recommendation is to kill winter hardy grains 10 - 14 days before planting corn:
  - Reduces potential disease & insect risk
  - This can be a timing issue with early planted corn & suitable field conditions.
- » 6"-8" tall (800-1,000lbs) is a good goal, > ht. and nitrogen tie up could be an issue
- » Tillage termination is difficult & reduces cover crop benefits.

### Termination guidelines in cool weather

- 60° - minimum daytime temperature
- 40° - minimum overnight temperature
- Midday ideal time for spray termination

## Planting

- » Planter needs to be set up for no-till to maintain a 2.0" – 2.5" optimum corn planting depth. Consider:
  - Adequate weight/down pressure
  - Disk openers in good shape
  - Row cleaners &/or coulters
  - Seed firmers
  - Spiked closing wheels
  - GPS to help maintain row spacing.  
*Harder to see marker in partially killed cereal rye.*

## Other considerations

- » Small seed broadleaves are better than larger seed broadleaves when broadcasting and leaving on the surface. (*i.e. brassicas, mustards*)
- » Use with a long-term no-till system to maximize the cover crop benefits.
- » Consider reducing soybean maturity to increase cover crop growing time.
- » Don't increase or decrease N because you use a cover crop.
- » Use ISU Corn Nitrogen Rate Calculator for N rate. Reducing nitrate loss from field does not necessarily equate to needing less N. Extra saved nitrogen may actually help build soil organic matter.
- » Drill broadleaves ¼ - ¾" deep; cereal grains ¾ - 1 ½" deep
- » Soil health tests can help measure if you're going in the right direction, OM is very slow to change.
- » Use 25-30 lbs. of cereal rye with winter killed oats or broadleaves.

## C:N Ratios

**Table 1.** Carbon to nitrogen (C:N) ratios of crop residues and other organic materials.

Material	C:N Ratio
rye straw	82:1
wheat straw	80:1
oat straw	70:1
corn stover	57:1
rye cover crop (anthesis)	37:1
pea straw	29:1
rye cover crop (vegetative)	26:1
mature alfalfa hay	25:1
<b>Ideal Microbial Diet</b>	<b>24:1</b>
rotted barnyard manure	20:1
legume hay	17:1
beef manure	17:1
young alfalfa hay	13:1
hairy vetch cover crop	11:1
soil microbes (average)	8:1

slower ↑  
 Relative Decomposition Rate  
 ↓ faster



**For More Information:** Contact your local NRCS office.

