United States Department of Agriculture

NRCS Natural Resources Conservation Service

Cover Crop Job Sheet (340)
Nitrogen Fixation

Natural Resources Conservation Service (NRCS) **April 2015**

Legume and Cereal Rye Cover Crop Mixture

Producer Name: _____
Contract # _____

INFORMATION ON THIS JOB SHEET IS CONSIDERED TO BE PART OF THE CONTRACT AND/OR CONSERVATION PLAN.

Purpose

The purpose of this job sheet is to establish a legume and cereal rye cover crop mixture that fixes nitrogen naturally for the soil system, controls erosion and improves soil quality. These cover crops will maintain soil cover and live roots at times when the field would otherwise be bare or fallow for more than 30 days.

Conditions Where Practice Applies

Practice applies on all lands where landowners wish to improve natural plant nutrient cycling, provide vegetative cover for natural resource protection and improvement of soil quality.

Establishment Specifications

1. Plant species and seeding rates will be performed according to **Table 1** on page 4 of this document. Legume cover crop mixtures should consist of cereal rye and at least one legume. Cereal rye is the small grain of choice due to its surface biomass, root production and ability to hold the soil. Eligible legume species are: Austrian winter pea, crimson clover, hairy vetch, and red clover. See the "Kentucky Cover Crop Guidance" document attached to the Cover Crop Standard 340 located in the Section IV of Kentucky's Field Office Technical Guide for more information.

See **Table 2** for "Estimated Nitrogen (N) Credits for this mixture.

2. Seed will conform to minimum state standards for purity, germination and other features. Commercially marketed seed in Kentucky meets these requirements. **Organic producers should ensure the use of organic seed when available. Contact State Organic Certifier for more information.**

3. Landowners may want to soil test to insure adequate fertility exists in applicable fields. It should be noted that it is critical for soil pH to be brought into the appropriate range for the type of plants being grown before large amounts of biomass are added to the soil surface. Large amounts of surface biomass buffers soil pH making it more difficult to adjust pH up or down.

Seeding and Seedbed Preparation

No-till establishment is the preferred method of seeding since soil disturbance is minimal, thus reducing weed competition and the risk of soil erosion. Conventional seeding may be used for establishment on areas that have been recently cropped, where weedy competition will be lessened and where the risk of soil erosion is minimal.

Important: If soil is wet avoid no-till planting or cultipacking planted seedbeds. This may result in placing the seed too deep in the ground.

Seeding Dates

See seeding dates in the "Cereal Rye and Legume Cover Crop Mixture Seeding Options and Dates" box in Table 1 for specific seeding mixtures. Seeding dates and mixtures can also be found in the "Kentucky Cover Crop Guidance" document attached to the Cover Crop 340 Standard located in the eFOTG, section IV.

Legume cover crop mixtures in Kentucky should be sown no later than October 15th. It's worth noting that various cereal rye and legume cover crop mixtures have various seeding date recommendations depending on legume species used in the mixture. Seedings during the earlier portion of the recommended seeding window insure better legume establishment and less winter mortality of legume plants.

No-Till Seeding

Care should be exercised to insure that appropriate cover crop mixture seeding rates and seeding depths are obtained when using no-till drills or planters.

Conventional Seeding

The importance of a dry firm seedbed cannot be over emphasized to ensure proper planting depth.

Seedbeds may be prepared by disking.

Once seedbed is prepared, broadcast seed, cultipack, harrow or roll the seeded area only once to ensure good seed to soil contact and the proper seeding depth.

Aerial Seeding

Seeding rates must be increased by at least 25% for all cover crop seed species to insure adequate cover crop stand. Optimum seeding dates for aerial seeding are from **September 1st through 10th** at all locations within Kentucky. It should be noted that if aerial seeding is the desired method of planting it is imperative that appropriate growing season cash crop varieties be grown so cover crop can be sown in a timely manner and according to the above seeding date specifications for aerial seeding.

When possible, aerial seeding should be performed over top of an existing crop before leaves of the existing crop fall to the ground. (Example: Aerial seeding of cover crop over soybeans prior to fall of soybean foliage.)

Operation and Maintenance

Cover crops should not be terminated prior to stage 10 of the attached Purdue University Extension Service, "Small Grain Growth Stages" (see Insert 1) if maximizing nitrogen fixation is landowners main objective.

If landowners desire crop insurance, the latest cover crops can be terminated is at or within 5 days after planting of cash crop but before cash crop emergence to be in compliance with Risk Management Agency insurance guidelines.

It is suggested to allow cover crop to grow to the day of planting at which time cover crop should be terminated. **Nitrogen fixing cover crops must be allowed to grow until April 15th West of Interstate 65 and April 30th East of Interstate 65 to fix substantial quantities of nitrogen for cash crops**.

Terminated by roll down in conjunction with a chemical burn down is recommended with all plant residues left on soil surface. **Organic producers should ensure the use of organically approved chemicals. Contact State Organic Certifier for more information.**

Roll down can be accomplished using roller crimpers, stalk choppers or cultipackers. Roller crimpers and stalk choppers are the preferred due to their crimping abilities, which cultipackers do not have. Where cover crops are to be tilled into the soil surface it is recommended that a full mow down of cover crop be completed first and then cover crop mixture tilled into the soil surface.

Cover Crops CANNOT be harvested for grain, silage, or hay. All cover crop residue must be left in field.

Insert 1: Purdue University Extension Service

Small Grains Growth Stages

Stage 1
3-Leaf Stage: The first two leaves are completely developed, and the middle, or third, leaf is partially developed.

Stage 2
The tillers (sometimes called side shoots) are beginning to form.

Stage 3
Tillers have formed and are in their primary growth stage.

Stage 4
Tillers have ended their growth and the leaf sheaths (the lower part of the leaf which surrounds the stem) begin to form.

Stage 5
Leaf sheaths are strongly erected and the stems formed start to grow in length.

Stage 6
One-Joint Stage: The first joint develops near the soil surface and can be felt inside the stem. The joints, or nodes, produce a swelled appearance in the lower portion of the stem.

Stage 7
Two-Joint Stage: The second joint has formed, marking the beginning of the reproductive phase.

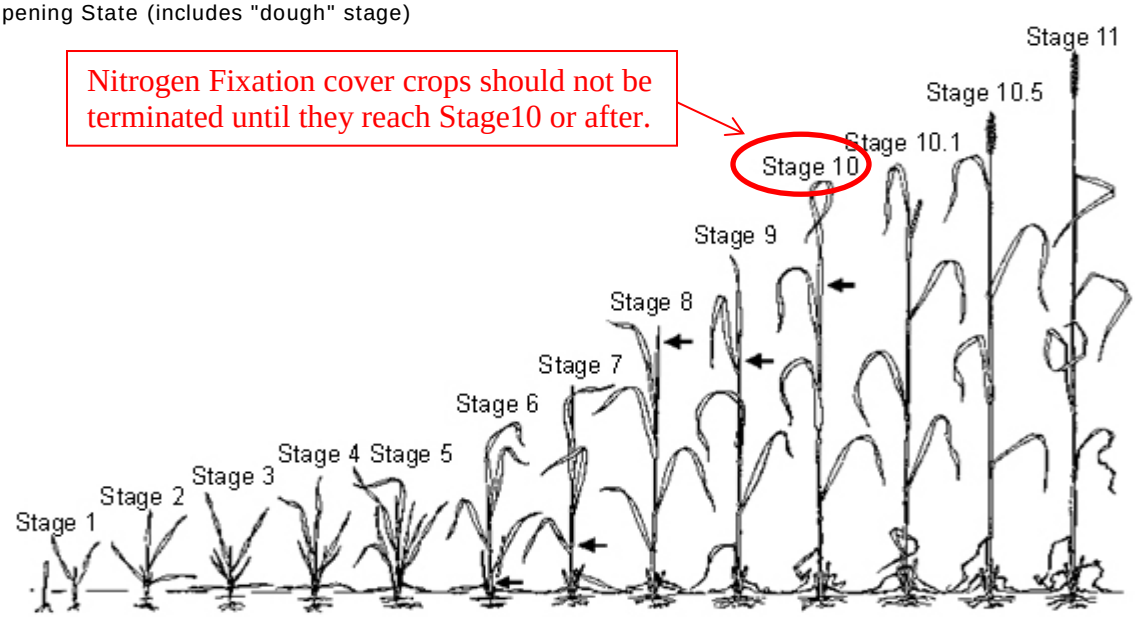
Stage 8
Appearance of the last leaf.

Stage 9
Ligule Stage: The ligule (a membrane at the junction of the leaf sheath and leaf base) of the last leaf is fully developed, and the leaf sheath is swollen at the level of the capsuled head of grain.

Stage 10 (Nitrogen Fixation cover crops should not be terminated until they reach Stage 10 or after)
"Boot" Stage: At this stage, the immature head of grain presses the rolled leaf sheath apart and becomes visible.

Stage 10.1
Head Emergence Stage

Stage 10.5
Flowering Stage *Stage 11*
Ripening State (includes "dough" stage)



Producer Name: _____ **Date:** _____

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Table 1. Species and seeding rates will be according to the information provided table below. If additional room is needed, make copies of this table and attach it to the back of job sheet.

Tract Number: _____

Field No.	Acres	Cover Crop Mixture Species	Lbs./Ac Seed	Total Lbs. Seed Required	Seeding Method (No-Till or Conventional)	Seeding Date

Common Nitrogen Fixing Seeding Options & Dates:

Cover Crop Mixtures With Seeding Rates **	**Seeding Dates**	***Kentucky Cover Crop Guidance Document Table 1 Cover Crop ID #**
Cereal Rye (35 lbs/ac) and Crimson Clover (20 lbs/ac)	**8/15 – 10/15**	**# 18**
Cereal Rye (35 lbs/ac) and Austrian Winter Pea (40 lbs/ac)	**8/15 – 10/15**	**# 20**
Cereal Rye (35 lbs/ac) and Hairy Vetch (20 lbs/ac)	**8/15 – 9/15**	**# 21**
Cereal Rye (35 lbs/ac) and Red Clover (10 lbs/ac)	**8/15 – 9/15**	**# 19**

****(When aerial seeding cover crops, seeding rates must be increased by a minimum of 25%)**

(Seeding rates/dates were interpreted from University of Kentucky recommendations and guidelines, SARE Managing Cover Crops Profitably Manual, and recommendations of the USDA-NRCS East National Technical Support Center.)

*See the "Kentucky Cover Crop Guidance" document attached to the Cover Crop 340 Standard located in the eFOTG, section IV for other nitrogen fixing cover crop mixtures and seeding rates (Table 1, Cover Crop ID #s 18, 19, 20, and 21).

Table 2: Estimated Nitrogen (N) Credits for Cover Crop Mixtures Containing Legumes

Eligible Cover Crop Mixture Species	***Est. N Credits** **No-tilled**	***Est. N Credits** **Tilled**
Winter Legume (legumes and cereal rye mixtures):		
Hairy Vetch (20 lbs/ac) and Cereal Rye (35 lbs/ac) – or	35 lbs/ac	18 lbs/ac
Crimson Clover (20 lbs/ac) and Cereal Rye (35 lbs/ac) or	30 lbs/ac	15 lbs/ac
Austrian Winter Pea (40 lbs/ac) and Cereal Rye (35 lbs/ac) or	35 lbs/ac	18 lbs/ac
Red Clover (10 lbs/ac) and Cereal Rye (35 lbs/ac)	30 lbs/ac	15 lbs/ac
Summer Legumes (single species):		
Cowpeas (90 lbs/ac)	80 lbs/ac	40lbs.ac
Soybeans (75 lbs/ac)	35 lbs/ac	18 lbs/ac
Red Clover (10 lbs/ac)	56 lbs/ac	28 lbs/ac
Soil Health Mixture of the following 4 species: Cereal Rye (35 lbs/ac) Crimson Clover (10 lbs/ac) Austrian Winter Pea (29 lbs/ac) Daikon Radish (1.5 lbs/ac)	74 lbs/ac	37 lbs/ac

*It should be noted there are several variables that cannot be accurately estimated that have a significant impact on a cover crop's ability to "fix" and/or "sequester" nitrogen in a soil system. Due to these factors, we have used conservative estimates in the above table for "Estimated Nitrogen Credits" for each individual species or mixture listed. To obtain more accurate estimated nitrogen credits on individual fields landowners should have a potentially mineralizeable nitrogen test or a soil microbial food web analysis completed on individual field samples.

Certifications			
Job Sheet	Prepared by:	Title:	Date:
	Approved by:	Title:	Date:
Installation	Meets NRCS standards and specifications.		
	Certification by:	Title:	Date: