

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD**

**COVER CROP**

(Ac.)

**CODE 340**

**DEFINITION**

Grasses, legumes, and forbs planted for seasonal vegetative cover.

**PURPOSE**

This practice is applied to support one or more of the following purposes:

- Reduce erosion from water.
- Maintain or increase soil health and organic matter content.
- Reduce water quality degradation by utilizing excessive soil nutrients.
- Suppress excessive weed pressures and break pest cycles.
- Improve soil moisture use efficiency.
- Minimize soil compaction.

**CONDITIONS WHERE PRACTICE APPLIES**

All lands requiring seasonal vegetative cover for natural resource protection or improvement.

**CRITERIA**

**General Criteria Applicable to All Purposes**

Plant species, seedbed preparation, seeding rates, seeding dates, seeding depths, fertility requirements, and planting methods will be consistent with applicable local criteria and soil/site conditions.

Select species that are compatible with other components of the cropping system.

Ensure herbicides used with crops are compatible with cover crop selections and purpose(s).

Cover crops may be established between

successive production crops, or companion-planted or relay-planted into production crops. Select species and planting dates that will not compete with the production crop yield or harvest.

Do not burn cover crop residue.

Determine the method and timing of termination to meet the grower's objective and the current NRCS Cover Crop Termination Guidelines.

When a cover crop will be grazed or hayed ensure that crop selection(s) comply with pesticide label rotational crop restrictions and that the planned management will not compromise the selected conservation purpose(s).

Do not harvest cover crops for seed.

If the specific rhizobium bacteria for the selected legume are not present in the soil, treat the seed with the appropriate inoculum at the time of planting.

**Additional Criteria to Reduce Erosion from Water**

Time the cover crop establishment in conjunction with other practices to adequately protect the soil during the critical erosion period(s).

Select cover crops that will have the physical characteristics necessary to provide adequate erosion protection.

Use the current erosion prediction technology to determine the amount of surface and/or canopy cover needed from the cover crop to achieve the erosion objective.

Conservation practice standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact your Natural Resources Conservation Service [State Office](#) or visit the [Field Office Technical Guide](#).

**KY NRCS  
December 2015**

**Additional Criteria to Maintain or Increase Soil Health and Organic Matter Content**

Cover crop species will be selected on the basis of producing higher volumes of organic material and root mass to maintain or increase soil organic matter.

The planned crop rotation including the cover crop and associated management activities will score a Soil Conditioning Index (SCI) value > 0, as determined using the current approved NRCS Soil Conditioning Index (SCI) procedure, with appropriate adjustments for additions to and or subtractions from plant biomass.

The cover crop shall be planted as early as possible and be terminated as late as practical for the producer's cropping system to maximize plant biomass production, considering crop insurance criteria, the time needed to prepare the field for planting the next crop, and soil moisture depletion.

**Additional Criteria Reduce Water Quality Degradation by Utilizing Excessive Soil Nutrients**

Establish cover crops as soon as practical prior to or after harvest of the production crop. (i.e. before or after harvest)

Select cover crop species for their ability to effectively utilize nutrients.

Terminate the cover crop as late as practical to maximize plant biomass production and nutrient uptake. Practical considerations for termination date may include crop insurance criteria, the amount of time needed to prepare the field for planting the next crop, weather conditions, and cover crop effects on soil moisture and nutrient availability to the following crop.

If the cover crop will be harvested for feed (hay/balage/etc.), choose species that are suitable for the planned livestock, and capable of removing the excess nutrients present.

**Additional Criteria to Suppress Excessive Weed Pressures and Break Pest Cycles**

Select cover crop species for their life cycles, growth habits, and other biological, chemical and or physical characteristics to provide one or more of the following:

- To suppress weeds, or compete with weeds.
- Break pest life cycles or suppress of plant pests or pathogens.
- Provide food or habitat for natural enemies of pests.
- Release compounds such as glucosinolates that suppress soil borne pathogens or pests.

Select cover crop species that do not harbor pests or diseases of subsequent crops in the rotation.

**Additional Criteria to Improve Soil Moisture Use Efficiency**

In areas of limited soil moisture, terminate growth of the cover crop sufficiently early to conserve soil moisture for the subsequent crop. Cover crops established for moisture conservation shall be left on the soil surface.

In areas of potential excess soil moisture, allow the cover crop to grow as long as possible to maximize soil moisture removal.

**Additional Criteria to Minimize Soil Compaction**

Select cover crop species that have the ability to root deeply and the capacity to penetrate or prevent compacted layers.

**CONSIDERATIONS**

Plant cover crops in a timely matter and when there is adequate moisture to establish a good stand.

When applicable, ensure cover crops are managed and are compatible with the client's crop insurance criteria.

Maintain an actively growing cover crop as late as feasible to maximize plant growth, allowing time to prepare the field for the next crop and to optimize soil moisture.

Select cover crops that are compatible with the production system, well adapted to the region's

climate and soils, and resistant to prevalent pests, weeds, and diseases. Avoid cover crop species that harbor or carry over potentially damaging diseases or insects.

Cover crops may be used to improve site conditions for establishment of perennial species.

When cover crops are used for grazing, select species that will have desired forage traits, be palatable to livestock, and not interfere with the production of the subsequent crop.

Use plant species that enhance forage opportunities for pollinators by using diverse legumes and other forbs.

Cover crops may be selected to provide food or habitat for natural enemies of production crop pests.

Cover crop residues should be left on the soil surface to maximize allelopathic (chemical) and mulching (physical) effects.

Seed a higher density cover crop stand to promote rapid canopy closure and greater weed suppression. Increased seeding rates (1.5 to 2 times normal) can improve weed-competitiveness.

Cover crops may be selected that release biofumigation compounds that inhibit soil-borne plant pests and pathogens.

Species can be selected to serve as trap crops to divert pests from production crops.

Select a mixture of two or more cover crop species from different plant families to achieve one or more of the following: (1) species mix with different maturity dates, (2) attract beneficial insects, (3) attract pollinators, (4) increase soil biological diversity, (5) serve as a trap crop for insect pests, or (6) provide food and cover for wildlife habitat management.

Plant legumes or mixtures of legumes with grasses, crucifers, and/or other forbs to achieve biological nitrogen fixation. Select cover crop species or mixture, and timing and method of termination that will maximize efficiency of nitrogen utilization by the following crop, considering soil type and conditions, season and weather conditions, cropping system, C:N ratio of the cover crop at termination, and anticipated nitrogen needs of the subsequent crop. Use

LGU- recommended nitrogen credits from the legume and reduce nitrogen applications to the subsequent crop accordingly. "If the specific rhizobium bacteria for the selected legume are not present in the soil, treat the seed with the appropriate inoculum at the time of planting.

Time the termination of cover crops to meet nutrient release goals. Termination at early vegetative stages may cause a more rapid release compared to termination at a more mature stage.

Both residue decomposition rates and soil fertility can affect nutrient availability following termination of cover crops

Allelopathic effects to the subsequent crop should be evaluated when selecting the appropriate cover crop.

Legumes add the most plant-available N if terminated when about 30% of the crop is in bloom.

#### **Additional Considerations to Reduce Erosion by Water**

To reduce erosion, best results are achieved when the combined canopy and surface residue cover attains 90 percent or greater during the period of potentially erosive rainfall.

Utilize no-till to plant cover crops whenever possible to prevent soil erosion.

#### **Additional Considerations to Reduce Water Quality Degradation by Utilizing Excessive Soil Nutrients**

Use deep-rooted species to maximize nutrient recovery.

When appropriate for the crop production system, mowing certain grass cover crops (e.g., sorghum-sudangrass, pearl millet) prior to heading and allowing the cover crop to regrow can enhance rooting depth and density, thereby increasing their subsoiling and nutrient-recycling efficacy.

#### **Additional Considerations to Increase Soil Health and Organic Matter Content**

Increase the diversity of cover crops (e.g., mixtures of several plant species) to promote a wider diversity of soil organisms, and thereby promote increased soil organic matter.

Plant legumes or mixtures of legumes with grasses, crucifers, and/or other forbs to provide nitrogen through biological nitrogen fixation.

Legumes add the most plant-available N if terminated when about 30% of the crop is in bloom.

### PLANS AND SPECIFICATIONS

Prepare plans and specifications for each field or treatment unit according to the planning criteria and operation and maintenance requirements of this standard. Specifications shall describe the requirements to apply the practice to achieve the intended purpose for the practice site. Plans for the establishment of cover crops shall, as a minimum, include the following specification components in an approved Cover Crop, 340, Implementation Requirements document:

- Field number and acres
- Species of plant(s) to be established.
- Seeding rates.
- Seeding dates.
- Establishment procedure.
- Rates, timing, and forms of nutrient application (if needed).
- Dates and method to terminate the cover crop.
- Other information pertinent to establishing and managing the cover crop e.g., if haying or grazing is planned specify the planned management for haying or grazing.

### OPERATION AND MAINTENANCE

Evaluate the cover crop to determine if the cover crop is meeting the planned purpose(s). If the

cover crop is not meeting the purpose(s) adjust the management, change the species of cover crop, or choose a different technology.

### REFERENCES

A. Clark (ed.). 2007. Managing cover crops profitably. 3<sup>rd</sup> ed. Sustainable Agriculture Network Handbook Series; bk 9.

Hargrove, W.L., ed. Cover crops for clean water. SWCS, 1991.

Magdoff, F. and H. van Es. Cover Crops. 2000. p. 87-96 *In* Building soils for better crops. 2nd ed. Sustainable Agriculture Network Handbook Series; bk 4. National Agriculture Library. Beltsville, MD.

Reeves, D.W. 1994. Cover crops and erosion. p. 125-172 *In* J.L. Hatfield and B.A. Stewart (eds.) Crops Residue Management. CRC Press, Boca Raton, FL.

NRCS Cover Crop Termination Guidelines: <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/climatechange/?cid=stelprdb1077238>

Revised Universal Soil Loss Equation Version 2 (RUSLE2) website: <http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/tools/rusle2/>

Wind Erosion Prediction System (WEPS) website: <http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/tools/weps/>

USDA, Natural Resources Conservation Service, National Agronomy Manual, 4<sup>th</sup> Edition, Feb. 2011. Website: <http://directives.sc.egov.usda.gov/> Under Manuals and Title 190.

# KENTUCKY COVER CROP GUIDANCE

December 2015

**Table 1.** Species, seeding dates, and seeding rates for [Winter Cover Crops \(340\)](#) in rotations of annual crops. Use the heavier seeding rates when broadcast seeding or when seeding conditions are not ideal or outside the preferred seeding dates. All seeding recommendations are for pure live seed (PLS)

ID #	PLANT SPECIES	PREFERRED SEEDING DATES (Month/Day)	SEEDING RATE (lbs./Ac.)	REMARKS
1	Cereal Rye	8/15 – 11/1	50 - 75	Rye is more tolerant than wheat to herbicide carryover. Due to a potential allelopathic effect, avoid using wheat or rye for a temporary cover when planning native grasses as the permanent cover. It should be noted that oats may winter kill in Kentucky.
2	Wheat	10/10 – 11/1	90	
3	Oats	9/15 – 10/15 3/1 – 4/1	64 - 90	
4	Aroostook Rye	8/15 – 11/15	112	Will germinate at colder temperature. Use for late seeded cover crops. Faster germination and more canopy at cooler temperatures than wheat, rye, or oats. Limited availability.
5	Annual Ryegrass	8/15 – 10/1	18 - 25	Due to its potential to become a weed problem in Kentucky, only use this cover as a temporary cover construction practices or to aid permanent cover establishment. Do not use before native grasses.
6	Cereal Rye Crimson Clover Red Clover * Daikon Radish	East of I-65 8/15 – 9/15 West of I-65 9/1 – 9/30	35 10 8 1.5	Soil Quality Cover Crop recommended for the entire state of KY. For maximum nitrogen fixation, cover crop mixture should not be killed before April 15 <sup>th</sup> West of I-65 or April 30 <sup>th</sup> East of I-65.
7	Cereal Rye Austrian Winter Pea Crimson Clover * Daikon Radish	East of I-65 8/15 – 9/15 West of I-65 9/1 – 9/30	35 28 10 1.5	Soil Quality Cover Crop recommended for the entire state of KY. For maximum nitrogen fixation, cover crop mixture should not be killed before April 15 <sup>th</sup> West of I-65 or April 30 <sup>th</sup> East of I-65.
8	Cereal Rye Crimson Clover Hairy Vetch * Daikon Radish	East of I-65 8/15 – 9/15 West of I-65 9/1 – 9/30	35 10 12 1.5	Soil Quality Cover Crop recommended for the entire state of KY. For maximum nitrogen fixation, cover crop mixture should not be killed before April 15 <sup>th</sup> West of I-65 or April 30 <sup>th</sup> East of I-65.
9	Cereal Rye Red Clover Austrian Winter Pea * Daikon Radish	East of I-65 8/15 – 9/15 West of I-65 9/1 – 9/30	35 8 28 1.5	Soil Quality Cover Crop recommended for the entire state of KY. For maximum nitrogen fixation, cover crop mixture should not be killed before April 15 <sup>th</sup> West of I-65 or April 30 <sup>th</sup> East of I-65.
10	Cereal Rye Hairy Vetch Austrian Winter Pea * Daikon Radish	East of I-65 8/15 – 9/15 West of I-65 9/1 – 9/30	35 12 28 1.5	Soil Quality Cover Crop recommended for the entire state of KY. For maximum nitrogen fixation, cover crop mixture should not be killed before April 15 <sup>th</sup> West of I-65 or April 30 <sup>th</sup> East of I-65.
11	Cereal Rye Hairy Vetch Red Clover * Daikon Radish	East of I-65 8/15 – 9/15 West of I-65 9/1 – 9/30	35 12 8 1.5	Soil Quality Cover Crop recommended for the entire state of KY. For maximum nitrogen fixation, cover crop mixture should not be killed before April 15 <sup>th</sup> West of I-65 or April 30 <sup>th</sup> East of I-65.

\*In situations where crop field does not have a compaction issue Daikon Radish can be removed from the cover crop mixture and seeding date can be extended to October 15<sup>th</sup>.

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ID #	PLANT SPECIES	PREFERRED SEEDING DATES (Month/Day)	SEEDING RATE (lbs./Ac.)	REMARKS
12	Cereal Rye Daikon Radish	8/15 – 9/30	50 – 75 2 - 5	Effective cover crop mixture to sequester fall N left in the soil from cash crop production. Early sowing of cover crop mixture will insure better establishment of daikon radish and better N sequestration.
13	Hairy Vetch	8/1 – 9/10	20 - 30	Hard seeds may germinate later and pose a problem in wheat or soybeans. May also be used with tobacco.
14	Tall Fescue or Orchard grass	2/1 – 4/15 & 8/20 – 9/30	10 - 15 10 - 15	These grasses may be seeded with red clover, alsike clover, or ladino clover as indicated below. Use orchard grass over fescue when wildlife is a concern.
15	Red Clover or Alsike Clover or Ladino Clover	2/1 – 4/15 & 8/1 – 9/10	8 - 12 4 - 6 1 - 3	These legumes should be included in a mix with fescue or orchard grass. Inoculate the legume seeds with proper inoculant.
16	Crimson Clover	8/1 – 10/15	20 - 30	Winter annual legume. Good canopy. Not suited to poorly drained soils. Will produce more forage at lower temperatures than other clovers. Not as winter hardy as other cover crop options.
17	Austrian Winter Pea	8/1 – 10/15	48	Winter annual legume with wildlife benefits. High Nitrogen Fixation/High Biomass crop. Not as winter hardy other cover crop options.
18	Cereal Rye Crimson Clover	8/15 – 10/15	35 20	This cover crop mixture is designed to be sown in late summer/early fall to fix nitrogen naturally in the soil system for the following cash crop while controlling erosion.
19	Cereal Rye Red Clover	8/15 – 9/15	35 10	This cover crop mixture is designed to be sown in late summer to fix nitrogen naturally in the soil system for the following cash crop while controlling erosion.
20	Cereal Rye Austrian Winter Pea	8/15 – 10/15	35 40	This cover crop mixture is designed to be sown in late summer/early fall to fix nitrogen naturally in the soil system for the following cash crop while controlling erosion.
21	Cereal Rye Hairy Vetch	8/15 – 9/15	35 20	This cover crop mixture is designed to be sown in late summer to fix nitrogen naturally in the soil system for the following cash crop while controlling erosion.

## Winter Green Manure Cover Crop Mixture

22	Cereal Rye	8/15 – 10/1	40	Primarily for high biomass production and high nitrogen production.  Care should be taken to kill vetch prior to seed maturation in the spring of the year to avoid volunteer vetch growth in the future.  When grown during the normal growing season (i.e. planted according to the dates recommended) the biomass should be rolled down in the spring and no-till planted through with a cash crop to receive maximum benefits from this cover.
	Winter Peas		30	
	Hairy Vetch		10	
	Crimson Clover		10	

NOTE: When aerial sowing cover crop (or cover crop mixtures) increase seeding rate by 25% and insure aerial seeding of cover crop is performed before leaf drop of cash crop.

# KENTUCKY COVER CROP GUIDANCE

December 2015

**Table 2.** Species, seeding dates, and seeding rates for **Summer Cover Crops(340)**.

Use heavier seeding rates when seedbed or seeding conditions are not ideal or when outside the preferred seeding dates. If aerial seeding, sow before cash crop leaf fall and increase seeding rate by 25%. Note: ALL PLANT SPECIES LISTED IN BELOW TABLES SHOULD BE SOWN AS A COMPLETE MIXTURE. All seeding recommendations are for pure live seed (PLS).

## Summer Annual Cover Crop Mixture Option #1

PLANT SPECIES	PREFERRED SEEDING DATES (Month/Day)	SEEDING RATE ( lbs/Ac)	REMARKS
Pearl Millet	6/1 – 6/15	1	Summer annual cover crop mixtures are excellent for increasing diversity in the soil microbial food web.
Proso Millet		2	
Sudan		4	If any species in the summer annual cover crop mixture is already being grown in the existing crop rotation it may be deleted from the summer annual cover crop mixture with a corresponding increase in another like kind species. For example: Delete soybeans due to rotation already containing soybeans- a corresponding increase in another legume should be made.
Soybean		15	
Cowpea		20	
Sunflower		1	
Radish		1	
Corn		1	

NOTE: No-till drill is the preferred method of seeding.

-Other species that could be added into mixture include: Phacelia (1 lb/ac), Sunn Hemp (5 lbs/ac), etc.

-When aerial sowing cover crop (or cover crop mixtures) increase seeding rate by 25% and insure aerial seeding of cover crop is performed before leaf drop of cash crop.

## Summer Annual Cover Crop Mixture Option #2

PLANT SPECIES	PREFERRED SEEDING DATES (Month/Day)	SEEDING RATE (lbs/Ac)	REMARKS
Oats	6/1 – 6/15	10	Summer annual cover crop mixtures are excellent for increasing diversity in the soil microbial food web.
Austrian Winter Pea		5	
Cowpea		3	If any species in the summer annual cover crop mixture is already being grown in the existing crop rotation it may be deleted from the summer annual cover crop mixture with a corresponding increase in another like kind species. For example: Delete soybeans due to rotation already containing soybeans- a corresponding increase in another legume should be made.
Pearl Millet		3	
Sunn Hemp		2	
Ethiopian Cabbage		1	
Radish		1	

NOTE: No-till drill is the preferred method of seeding.

-Other species that could be added into mixture include: Phacelia (1 lb/ac), Berseem Clover (5 lbs/ac), etc.

-When aerial sowing cover crop (or cover crop mixtures) increase seeding rate by 25% and insure aerial seeding of cover crop is performed before leaf drop of cash crop.

# KENTUCKY COVER CROP GUIDANCE

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## Summer Green Manure Cover Crop Mixture, Option #3

PLANT SPECIES	PREFERRED SEEDING DATES (Month/Day)	SEEDING RATE (lbs./Ac.)	REMARKS
Bell Beans	3/1 – 4/15	35	Primarily for high biomass production and high nitrogen production. Care should be taken to kill vetch prior to seed maturation to avoid volunteer vetch growth in the future.
Magnus Peas		20	
Hairy Vetch		25	Terminate September 1-30 with a winter cover crop sown no later than 10/15. If cover crop is grazed only take 50% of biomass and leave 50% of biomass on the soil surface to increase soil health and feed soil microbial food web.
Oats or Cereal Rye		10	

## Single Species Summer Annual Cover Crops

PLANT SPECIES	PREFERRED SEEDING DATES (Month/Day)	SEEDING RATE ( lbs./Ac.)	REMARKS
Buckwheat	7/1 – 7/30	30 - 60	Excellent potential for summer biomass production.
Sudangrass and Sorghum/Sudan Hybrids	5/10 - 8/1	20 - 40	Excellent potential for summer biomass production and weed suppression. Potential for prussic acid problems in livestock.
Pearl Millet	5/1 – 8/1	15 – 25 (broadcast)	Excellent potential for summer biomass production and weed suppression. Potential for prussic acid problems in livestock.
Proso Millet	5/1 – 8/1	20 - 30	Excellent potential for summer biomass production and weed suppression.
Cowpeas	5/1 - 6/30	60 - 120	Inoculate, short term summer legume. Good nitrogen fixation cover.

## Organic Guidance

- Depending on the crops grown in an organic system, any of the cover crops listed in this document above could work in an organic system.
- If weed suppression is the goal then single species summer or winter grass species should be utilized.
- Producers would choose the best cover crop for their system based on guidance given by their organic planner or information from their organic plan.
- Species can be substituted based on organic seed availability.