

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD**

**COVER CROP**

(Ac.)

**CODE 340**

**DEFINITION**

Crops including grasses, legumes, and forbs for seasonal cover and other conservation purposes.

**PURPOSE**

- Reduce erosion from wind and water.
- Increase soil organic matter content.
- Capture, recycle, or redistribute nutrients in the soil profile.
- Promote biological nitrogen fixation and reduce energy use.
- Increase biodiversity.
- Suppress weed growth.
- Manage soil moisture.
- Minimize and reduce soil compaction.

**CONDITIONS WHERE PRACTICE APPLIES**

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

**CRITERIA**

**General Criteria Applicable to All Purposes**

Plant species, seeding rates, seeding dates, seeding depths will be established according to Table 1.

Seed planted with broadcast methods after primary crop harvest shall be incorporated with a harrow, cultipacker, roller, or vertical tillage tool to achieve adequate seed soil contact.

Cover crop(s) seeded prior to the harvest of the primary crop shall limit the damage to the standing crop. Cover crops seeding into soybeans should not be before the leaves are

turning yellow approximately growth stage R7-R8.

The species selected will be compatible with other components of the cropping system.

Cover crops will be terminated by harvest, grazing, frost, mowing, tillage, crimping, and/or herbicides in preparation for the following crop.

Herbicides used with cover crops will be compatible with the following crop.

Herbicides used for a main crop will be selected to be compatible with the planned cover crop species.

Do not use plant species that are on the Illinois noxious weed lists.

Cover crop residue will not be burned.

Cover crop species and seed rates will be selected from Table 1. Seed rates listed in Table 1 are for monoculture. Where a mixture of cover crop species is desired multiply the monoculture seeding rate by the desired percent of the mixture. The species listed in Table 1 are not all inclusive as numerous other species may be used alone or in mixtures. Cover crop mixtures listed in Table 1 represent common mixtures that have been successfully used in Illinois. Cover crop mixtures containing multiple species are allowable. Contact NRCS for recommendations.

Planting dates for wheat cover crops will observe the Hessian Fly free dates shown in the current Illinois Agronomy Handbook.

**Additional Criteria to Reduce Erosion from Wind and Water**

Establish cover crop in conjunction with other practices, so that the soil will be adequately protected during the critical erosion period(s). Do not use establishment methods that entail pre-plant tillage seedbed preparation after mid-October. Broadcast seeding followed by

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](#).

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incorporation with a harrow, cultipacker, roller, or vertical tillage is permissible after mid-October.

Plants selected for cover crops will have the physical characteristics necessary to provide adequate soil protection.

Determine the amount of surface and/or canopy cover needed from the cover crop using current erosion prediction technology.

#### **Additional Criteria to Increase Soil Organic Matter Content**

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

The NRCS Soil Conditioning Index (SCI) procedure will be used to determine the amount of biomass required to have a positive trend in the soil organic matter subfactor.

The cover crop shall be planted as early as possible and be terminated as late as feasible 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 to Capture and Recycle Excess Nutrients in the Soil Profile**

Cover crops will be established and actively growing before the expected period(s) of nutrient leaching.

Select cover crop species for their ability to take up large amounts of nutrients from the rooting profile of the soil.

When used to redistribute nutrients from deeper in the profile up to the surface layer, the cover crop will be killed in relation to the planting date of the following crop. If the objective is to best synchronize the use of cover crop as a green manure to cycle nutrients, then the carbon/nitrogen ratios should be considered. Kill the cover crop at a date that will match release of nutrient with uptake by following cash crop. A late kill may be used if there are additional objectives such as weed suppression and residue cover. The appropriate kill date for the cover crop will depend on the specific rotation, weather and objectives.

To maximize uptake of excess plant nutrients, (nitrates) suitable cover crops should follow each crop in the crop rotation.

#### **Additional Criteria to Promote Biological Nitrogen Fixation and Reduce Energy Use**

Use legumes or legume-grass mixtures to establish cover crops.

The specific Rhizobia bacteria for the selected legume will either be present in the soil or the seed will be inoculated at the time of planting. Legume species not grown within the previous 3 years shall be inoculated. Refer to Illinois Agronomy Technical Note Number 20 for guidance.

#### **Additional Criteria to Increase Biodiversity**

Select cover crop species to achieve one or more of the following: species mix with different maturity dates, attract beneficial insects, attract pollinators, increase soil biological diversity, serve as a trap crop for damaging insects, and/or provide food and cover for wildlife habitat management.

#### **Additional Criteria for Weed Suppression**

Species for the cover crop will be selected for their chemical or physical characteristics to suppress or compete with weeds.

Higher seeding rates to provide additional cover will help control weeds to eliminate or reduce herbicide use.

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

A late kill may be used if the objectives are to use as a biocontrol.

For long-term weed suppression, reseeding annuals and/or biennial species can be used.

#### **Additional Criteria for Soil Moisture Management**

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 and Reduce Soil Compaction**

Select and manage cover crop species that will produce deep roots and large amounts of surface or root biomass to increase soil organic matter, improve soil structure, and increase soil moisture through better infiltration.

### **CONSIDERATIONS**

Plant cover crops in a timely matter to establish a good stand.

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 moisture depletion.

When used to redistribute nutrients from deeper in the profile up to the surface layer, consider killing of the cover crop in relation to the planting date of the following cash crop.

If the objective is to best synchronize the use of cover crop as a green manure to cycle nutrients, factors such as the carbon/nitrogen ratios may be considered to kill early and have a faster mineralization of nutrients to match release of nutrient with uptake by following cash crop. Plant early planted cash crops when selecting winter killed cover crops.

The cover crop kill date will depend on the specific rotation, weather, and grower objectives.

Use deep-rooted species to maximize nutrient recovery.

Use grasses to utilize more soil nitrogen. Use legumes to utilize both nitrogen and phosphorus.

Avoid cover crop species that harbor or carryover potentially damaging diseases or insects.

For most purposes for which cover crops are established, the combined canopy and surface cover is at nearly 90 percent or greater, and the above ground (dry weight) biomass production is at least 4,000 lbs/acre.

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

Use plant species that may provide bio-fuel.

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

Use a diverse mixture of 2 or more species to address multiple purposes.

### **PLANS AND SPECIFICATIONS**

Plans and specifications will be prepared for the practice site. Plans for the establishment of cover crops shall include:

- Field number and acres
- Species or species of plants to be established.
- Seeding rates.
- Recommended seeding dates.
- Establishment procedure.
- Planned rates and timing of nutrient application.
- Planned dates and method to terminate the cover crop.
- Other information pertinent to establishing and managing the cover crop.

Plans and specifications for the establishment and management of cover crops may be recorded in narrative form, on Job Sheet 340, or on other forms.

### **OPERATION AND MAINTENANCE**

Control growth of the cover crop to reduce competition from volunteer plants and shading.

Control weeds in cover crops by mowing or by using other pest management techniques.

Control soil moisture depletion by selecting water efficient plant species and terminating the cover crop before excessive transpiration.

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.

Tillage Radish<sup>TM</sup> Resource Guide.  
[www.TillageRadish.com](http://www.TillageRadish.com)

Table 1. Common Cover Crops

Species	Seeding rate (Lbs PLS./ac)	Seeding Dates N=North of I-70 S=South of I-70	Residual Nitrogen Recovery	Remarks
Wheat	60-90	N=Fly free date-10/15 S=Fly free date-11/15	Very Good	
Rye	40-80	N=8/1-10/31 S=8/15-11/15	Excellent	Easily established. Rapid growth in fall and spring.
Spring Oats	32-64	N=8/15-9/15 S=8/30-10/20	Very Good	Winter kills.
Winter Triticale	75	N=8/1-10/15 S=8/15-10/31	Very Good	
Annual Ryegrass	10-20	N=8/2-9/15 S=8/1-10/10	Very Good	
Buckwheat	30-90	Needs 45-60 days of growth	Poor	Summer smother crop. Residue degrades rapidly
<u>Brassicas</u> Rape or Canola or Turnips	2 drilled 6 broadcast	N=8/1-9/15 S=8/1-9/30	Good	
Forage/ Oilseed Radish	2-5 drilled 6-10 broadcast	N=8/1-9/15 S=8/1-9/30	Good	May suppress some nematode species. Should not precede or follow cruciferous crops. Winter kills. When precision planting: 2 lbs./ac. in 30" rows, 4 lbs./ac. in 15" rows using milo seed plates.

Species	Seeding rate (Lbs PLS./ac)	Seeding Dates N=North of I-70 S=South of I-70	Residual Nitrogen Recovery	Remarks
Sorghum- Sudangrass	20-40	N=7/1-8/1  S=7/1-8/15	Excellent	Mowing when stalks are 3-4 feet high increases root mass significantly. Biomass is maximized by fertilizing with nitrogen at 75-100 lbs./ac
Hairy Vetch	15-20	N=8/1-9/15  S=8/1-9/30	Fair	
Red Clover	8-12		Very Good	
Cowpea	30-40 drilled  70-90 broadcast	N=7/1-8/1  S=7/1-8/15	Fair	Tolerates heat and low fertility
White Clover	3-9		Fair	
Crimson Clover	10-15 drilled  20 broadcast	N=7/1-9/1  S=8/1-9/15	Good	
Field Peas/Winter Peas	50 drilled  70-90 broadcast	N=8/1-9/15  S=8/1-9/30	Fair	

Species	Seeding rate (Lbs PLS./ac)	Seeding Dates N=North of I-70 S=South of I-70	Residual Nitrogen Recovery	Remarks
<b>Common Cover Crop Mixtures</b>				
Hairy Vetch  +  Cereal Rye	15  +  40	N=8/15 to 9/15  S= 8/15 to 9/30	Good	
Spring Oats  +  Brassicas	40  +  3-6	N=8/15 to 9/15  S= 8/15 to 9/30	Good	
Sudangrass or Sudex  +  Cowpeas	15-20  +  40			Summer cover crop mixture suited to summer months.
Forage Radish  +  Austrian Winter Peas	2  +  20			Planted in 30 inch rows. Forage Radish and Peas are placed singly in every other seed hopper.