

**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.

Plant species, seedbed preparation, seeding rates, seeding dates, seeding depths, and planting methods will be consistent with Tables 1, 2 and 3 in the specifications and site conditions.

**PURPOSE**

- Reduce erosion from wind and water
- Increase soil organic matter content
- Capture and recycle or redistribute nutrients in the soil profile
- Promote biological nitrogen fixation
- Increase biodiversity
- Disease, weed, and insect suppression
- Provide supplemental forage
- Soil moisture management
- Reduce particulate emissions into the atmosphere
- Minimize and reduce soil compaction

The species selected will be compatible with conservation crop rotation (328), nutrient management (590) and pest management (595) provisions of the plan.

Seed must be clean and relatively free of weed seed and other contaminants. Plants that are on the state's noxious weed and invasive species lists shall not be included in seeding mixtures. Seed that has become wet, moldy, or otherwise damaged in transit or storage is not acceptable.

If seed is applied by a broadcast method, the area will be rolled or culti-packed immediately after seeding on a prepared seedbed only. If the seed is broadcast into heavy residue or a growing crop, seeding rate will be increased by 50% and rolling or culti-packing are not required.

**CONDITIONS WHERE PRACTICE APPLIES**

On all lands requiring vegetative cover for natural resource protection and/or improvement.

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

**CRITERIA**

**General Criteria Applicable to All Purposes**

***NOTE: Specific program guidance may be more restrictive on a number of these criteria. Refer to program manual for specific program requirements.***

Herbicides used with cover crops will be compatible with the following crop. Herbicide carryover may restrict the use of some plant species for the intended use. Refer to product label or complete a Bioassay herbicide residue test prior to planting.

Cover crop residue will not be burned.

### **Winter Cover and/or Green Manure following Row Crop Production.**

If seeding the cover crop prior to harvest of the primary crop, select an appropriate plant species and seeding rate from Table 1 of the specifications. Broadcast the seed by a method that allows for good coverage of the area and does the least acceptable crop damage to the standing crop. Seeding dates should be from August 15 to September 15 or prior to leaf drop of the primary crop. No seedbed preparation is necessary. If seeding the cover crop after the harvest of the primary crop, select plant species, seeding rate, seeding dates, and planting method from Table 1 of the specifications. Seed may be planted either no-till or broadcast into existing residue cover. Some light tillage is acceptable if planting is completed in a timely manner to allow for adequate crop growth before killing frost.

### **Living Cover and/or Green Manure Crops.**

Select seeding mixture, seeding rates, and planting dates from Table 2 of the specifications. Select species that provide desired benefits as a nurse crop, temporary cover, and/or green manure crop. See Table 3 of the specifications for cover crops suitable for orchards, vineyards, and small fruits.

Prepare the seedbed for planting the cover crop. If the site is currently producing crops, site preparation may not be necessary. If the site is to be seeded to a temporary cover to stabilize the soil resource, site preparation, seedbed preparation, and seeding shall meet the requirements of the Critical Area Planting (342) standard.

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

Cover crop establishment, in conjunction with other practices, will be timed so that the soil will be adequately protected during the critical erosion period(s).

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

The amount of surface and/or canopy cover needed from the cover crop shall be

determined using current approved water and wind erosion prediction technology.

Calculations shall account for the effects of other practices in the management system.

Winter rye, winter triticale, and winter wheat are vigorous, competitive cover. These species overwinter and will require herbicides or tillage to kill them prior to establishing the primary seeded crop.

Spring oats, sudan grass, and annual ryegrass will winterkill. These species are temporary cover crops that can be managed to improve site conditions for the planned cover. Time the planting of these cover crops to reduce the need for mowing or clipping.

#### **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. Cover crops are used in conjunction with conservation crop rotation (328) and residue management (329, 345, and 346) to produce adequate amounts of residue to increase soil organic matter.

The NRCS Soil Conditioning Index (SCI) procedure will be used to determine the amount of biomass required. At a minimum, the SCI will have a positive number.

The cover crop will be terminated as late as feasible to maximize plant biomass production.

#### **Additional Criteria to Capture and Recycle Excess Nutrients in the Soil Profile**

Cover crops will be established and be actively growing before expected periods of nutrient leaching.

Cover crop species will be selected for their potential ability to absorb large amounts of nutrients from the rooting profile of the soil.

The aboveground biomass will be removed from the field for maximum nutrient removal efficiency when nutrients will not be recycled through a subsequent crop or cover crop will be killed prior to reaching the reproductive stage when used to redistribute nutrients from the surface to deeper in the profile.

### **Additional Criteria to Promote Biological Nitrogen Fixation**

Only legumes or legume grass mixtures will be established as cover crops.

The specific Rhizobium bacteria for the selected legume will either be present in the soil or the seed will be inoculated at the time of planting.

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

Cover crop species shall be selected that have different maturity dates, attract beneficial insects, serve as a trap crop for damaging insects, and/or provide food and cover for wildlife habitat management.

### **Additional Criteria for Disease, Weed, and Insect Suppression**

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

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

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

### **Additional Criteria to Provide Supplemental Forage**

Species selected will have desired forage traits, be palatable to livestock, and not interfere with the production of the subsequent crop.

Forage provided by the cover crop may be hayed or grazed as long as sufficient biomass is left for resource protection.

### **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 until the subsequent crop is planted.

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

### **Additional Criteria to Reduce Particulate Emissions into the Atmosphere**

Manage cover crops and their residues so that at least 80% ground cover is maintained during planting operations for the following crop.

### **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

## **CONSIDERATIONS**

Plant cover crop in a timely manner 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.

Use deep-rooted species and species that have a high nutrient requirement to maximize nutrient recovery.

Use grasses that utilize more soil nitrogen, and legumes that utilize both nitrogen and phosphorus.

Avoiding 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 close to 90 percent or greater and the above ground (dry weight) biomass production is at least 4000 lb/acre.

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

Use plant species that enhance bio-fuel opportunities.

Use plant species that enhance forage opportunities for pollinators.

## **PLANS AND SPECIFICATIONS**

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

- Specie or species of plants to be established
- Seeding rates
- Recommended seeding dates
- Establishment procedure
- Planned rates and timing of nutrient application
- Planned dates or conditions for terminating cover crop
- Planned method(s) for terminating cover crop growth
- 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 sheets, on CPA-4 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.

## REFERENCES

These publications are available at County Extension Offices; Extension Distribution Center, Printing Building, Iowa State University, Ames, IA 50011; and several are available on the ISU Publications Home page at <http://www.extension.iastate.edu/Pages/pubs/>.

- ISU PM-601 "[Weed](#) Control Guide for current year".
- "Effect of Cover Crops for Weed Pest Management in Organic Vegetables". <http://extension.agron.iastate.edu/organica/researchreports/04gerberbeanspeas.pdf>

The following publications are available at the local NRCS field offices or the Iowa NRCS Home page at: <http://www.ia.nrcs.usda.gov>.

- Field Office Technical Guide Standards
  - [Nutrient Management \(590\)](#)
  - [Pest Management \(595\)](#)
  - Conservation Crop Rotation (328)
  - Critical Area Planting (342) standard
  - Residue and Tillage Management No-till, Strip Till, Direct Seeding (329)
  - Residue and Tillage Management Mulch Till (345)
  - Residue and Tillage Management Ridge Till (346)
- Revised Universal Soil Loss Equation Version 2 (RUSLE2) [http://fargo.nserl.purdue.edu/rusle2\\_dataweb/RUSLE2\\_Index.htm](http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm).

**TABLE 1**  
**COVER AND GREEN MANURE CROPS IN OR FOLLOWING FIELD CROPS**

<b>SPECIES</b>	<b>RATE OF SEEDING</b>	<b>TIME OF SEEDING</b>	<b>DEPTH OF SEEDING</b>	<b>REMARKS</b>
Perennial Rye	10 lbs/ac	At last cultivation or Aug. 15 – Oct. 15	¼ - ½ inch	Broadcast just ahead of or behind the last cultivation or broadcast and cover with suitable equipment following early harvested crops
Sudan grass	20-25 lbs/ac	May 15 – June 15	½ - 1 inch	<ul style="list-style-type: none"> <li>▪ For green manure crops between regular harvested crops</li> <li>▪ Prefer drilling to broadcast seeding</li> <li>▪ Uses high levels of nitrogen fertilizer</li> </ul>
Soybeans	1 bu/ac	May 10 – July 1	1 ½ inch	Broadcast just ahead of or behind the last cultivation or broadcast and cover with suitable equipment following early harvested crops
Buckwheat	45 lbs/ac	June to early July	1 – 2 inches	For grain or summer green manure
Hairy Vetch	15-20 lbs/ac	Sept. 10 – Oct. 1	1 – 2 inches	<ul style="list-style-type: none"> <li>▪ Can be seeded alone or with cereal rye for winter cover</li> <li>▪ Can be aerial seeded</li> </ul>
Corn	2 bu/ac	May 5 – June 5	1 ½ inch	<ul style="list-style-type: none"> <li>▪ Same as Sudan grass above</li> <li>▪ Uses supplemental or additional nitrogen fertilizer</li> </ul>
Cereal Rye	1-2 bu/ac	Corn – last cult or after early silage; Other crops Aug 15 – Oct 15	1 – 2 inches	Broadcast at the last cultivation of corn or aerial seed in late August
Winter Wheat	1-2 bu/ac	Sept. 10 – Oct 10	1 – 2 inches	Generally used when rye seed is not available
Oats	2-3 bu/ac	Aug 15 – Sept 15	1 – 2 inches	<ul style="list-style-type: none"> <li>▪ Will winterkill</li> <li>▪ For winter cover only</li> </ul>
Mammoth or medium Red Clover	8 lbs/ac	Early spring alone or in small grain or Aug 1 – Sept 15	¼ - ½ inch	Prefer drilling to broadcast
Sweet Clover	8 lbs/ac	Spring in small grain or Aug 1 – Sept 15	¼ - ½ inch	<ul style="list-style-type: none"> <li>▪ Prefer drilling to broadcast;</li> <li>▪ Do not use where red clover is harvested for seed</li> </ul>
Berseem Clover	15 lbs/ac	Spring in small grain	¼ - ½ inch	Summer annual
Crimson Clover	15 lbs/ac	Spring in small grain or Aug 1 – Sept 15	¼ - ½ inch	Winter annual that is easy to establish

**TABLE 2**  
**LIVING COVER AND GREEN MANURE CROPS**

<b>SPECIES</b>	<b>RATE OF SEEDING</b>	<b>TIME OF SEEDING</b>	<b>DEPTH OF SEEDING</b>	<b>REMARKS</b>
Perennial Rye Timothy	5 lbs/ac 4-5 lbs/ac	Spring before May1 or Aug 15 – Sept 15	¼ - ½ inch	Cover for orchards, vineyards, and bush fruits
Perennial Rye Red Fescue	5 lbs/ac 10 lbs/ac	”	“	Cover for orchards, vineyards and bush fruits
Perennial Rye Bluegrass	5 lbs/ac 5 lbs/ac	“	“	Cover for orchards, vineyards and bush fruits
Perennial Rye Red Top	5 lbs/ac 3 lbs/ac	“	“	Cover for orchards, vineyards and bush fruits
Red Clover Timothy	8 lbs/ac 3 lbs/ac	“	“	Cover for orchards, vineyards and bush fruits
Crownvetch	8 lbs/ac	March 1 – May 15	¼ - ½ inch	Cover for row crop production
Kura Clover	6 bu/ac	March 1 – May 15	¼ - ½ inch	Cover for row crop production

**Table 3**  
**COVER CROPS SUITABLE FOR ORCHARDS, VINEYARDS AND SMALL FRUIT**

<b>USE</b>	<b>CROP</b>
Annual cover in orchards, vineyards, and bush fruits	Rye, Winter Wheat, Perennial Ryegrass
Strawberries and other small fruit where elimination of green cover in spring is a problem.	Oats
Summer cover in non-bearing orchards.	Sudan grass, Corn, or Soybeans
Perennial cover between rows in orchards.	Red Clover and Timothy * (See living cover Table 2)