

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 and recycle or redistribute nutrients in the soil profile.
- Promote biological nitrogen fixation and reduce energy use.
- Increase biodiversity.
- Suppress weeds.
- 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**

Ensure that cover crop species and management methods are compatible with the producer's objectives, site conditions, and other crops and practices in the farming system.

Ensure that species selection and associated management specifications (seeding rates and dates, fertility requirements, etc.) are consistent with the Plant Establishment Guide for Virginia, Virginia technical notes, or other approved guidance.

Ensure that plants designated as noxious weeds in Virginia shall not be used as cover crops.

Ensure that cover crop residue is not burned.

For non-irrigated cover crops, timing of cover crop termination must be consistent with the attached *NRCS Cover Crop Termination Guidelines – Non-Irrigated Cropland*. The core requirement applicable to Virginia is that non-irrigated cover crops must be terminated no later than five days after planting of the subsequent crop, but before emergence of the subsequent crop.

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

Select and manage cover crops to ensure adequate protection of the soil during critical erosion periods.

Current erosion prediction technology shall be used to determine the amount of cover crop biomass and/or residue needed to achieve site-specific erosion reduction objectives.

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

Select and manage cover crops to produce and return to the soil large quantities of above- and below-ground organic material.

To maximize *total* soil organic matter (total soil C), select and manage cover crops to produce and return to the soil large quantities of long-lasting (high C:N ratio) residues. Use the current Soil Conditioning Index (SCI) procedure to determine the amount of cover crop biomass required to achieve a positive SCI soil organic matter subfactor (or another appropriate site-specific objective for total soil organic matter management).

To maximize *active* soil organic matter (living soil C) and associated soil biological activity,

select and manage cover crops to produce and return to the soil large quantities of readily-digestible (low C:N ratio) residues.

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

Select and manage cover crops to optimize uptake of one or more target nutrients from the soil.

To optimize capture of readily leachable nutrients such as nitrogen (N), ensure cover crops are established early enough to remove available nutrients from the soil profile before the period of greatest leaching risk begins.

To optimize total quantity of nutrients captured, terminate cover crops as late as feasible to maximize overall biomass and associated nutrient uptake.

Termination timing, termination method, and C:N ratio of cover crop residues are the most important factors determining whether or when nutrients captured by a cover crop will be available to the subsequent main crop. Take these factors into account when making cover crop management and termination decisions / recommendations.

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

Select and manage legume cover crops (or mixes with significant legume component) to fix N from the atmosphere for plant use.

Ensure that the specific Rhizobium bacteria necessary for N fixation by the selected legume(s) is either present in the soil or that the seed is properly inoculated at the time of planting.

Termination timing, termination method, and C:N ratio of cover crop residues are the most important factors determining whether or when nitrogen fixed by a legume cover crop will be available to the subsequent main crop. Take these factors into account when making cover crop management and termination decisions / recommendations.

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

Select and manage cover crops to increase plant diversity in the cropping system in order to achieve one or more of the objectives listed:

- Increase overall below-ground biological diversity and improve associated soil quality/soil function.

- Suppress diseases and non-weed pests of main crops through rotation to non-host cover crops and/or through cover crop release of substances toxic to pests (“biofumigation”).
- Improve above-ground habitat for beneficial insects (including pollinators) within the field or on the farm.
- Protect main crops by attracting pests away from those crops and towards cover / trap crops.

Improved biodiversity may be achieved by planting a single cover crop species new to the cropping system, or by planting multi-species cover crop mixes.

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

Select and manage cover crops in order to suppress weeds and/or reduce the weed seed bank. Weed suppression may be achieved through one or more of the following mechanisms:

- Competition for space, light, water, and/or nutrients by actively growing cover crops.
- Physical / mulching effects due to dead cover crop residues.
- Allelopathic effects due to chemicals released into the soil by living cover crops and/or dead cover crop residues.

Whenever possible, seed cover crops at high rates to enhance competitiveness with weeds and leave cover crop residues on the soil surface to enhance physical and chemical weed suppression after cover crop termination.

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

Select and manage cover crops to either eliminate or conserve soil moisture, as needed by the following crop(s).

To eliminate excess soil moisture, promote maximum cover crop growth and transpiration for as long as possible ahead of planting the following crop.

To conserve soil moisture, strive to maximize the amount of residue that will remain on the soil surface after cover crop termination, while taking into account the need to terminate the cover crop early enough to avoid drying out the soil profile ahead of the next crop.

### **Additional Criteria to Minimize and Reduce Soil Compaction**

Select and manage cover crop species to improve soil porosity, soil structure, and soil-water-air relations through one or more of the following mechanisms:

- Production of large diameter roots.
- Production of deep roots.
- Production of large quantities of root biomass.

### **CONSIDERATIONS**

A cover crop is a crop planted primarily, but not exclusively, to benefit the soil, the environment, or other crops in the rotation.

Harvesting cover crops is not prohibited under this Standard, but harvest should not be the primary reason for planting a cover crop.

Whether or not harvesting is appropriate will typically involve a case-by-case determination depending in large part on the purpose(s) for which the cover crop is being grown.

Harvesting will not impair a cover crop's ability to achieve certain purposes, such as late fall and early winter soil nitrogen (N) scavenging by a fall seeded small grain crop. However, harvesting may be incompatible with other cover crop purposes, such as maximizing total soil organic matter returned to the soil surface.

Soil health generally benefits with increasing above-ground biological diversity. Well-managed (i.e., controlled) grazing of cover crops by livestock can be a positive mechanism for increasing biological diversity and associated soil health.

Fertilization, including nitrogen fertilization, of cover crops may be needed depending on site conditions and the purpose(s) for which the cover crop is being grown.

Note that fertilization or harvesting of cover crops may be restricted by NRCS or other cost share programs, guidance, or policy that can be stricter than the minimum criteria of this Standard.

Cover crops may be terminated by tillage, herbicides, harvest, frost, mowing, crimping, natural senescence, or any combination of these methods.

Cover crops typically consist of annual species, but may include biennials and perennials when appropriate. In certain cropping systems, self-reseeding annuals can provide a form of perennial cover crop.

Cover crops are typically seeded after the main crop is harvested and terminated prior to main crop planting. However, intercropping or growing cover crops and main crops simultaneously in the same field is potentially acceptable if it fits the producer's cropping system and the attached *NRCS Cover Crop Termination Guidelines*.

Do not assume that growing a cover crop will automatically increase performance of the subsequent main crop. Especially for farmers trying new cover crops, careful cover crop selection and management is often essential in order to ensure that the cover crop does not depress subsequent main crop yields.

Cover crops typically have the greatest positive impact on harvested crop yields and overall profitability when they are used for multiple years as part of an integrated cropping system designed to build soil quality and soil fertility and to suppress weeds.

Whenever possible, consider recommending multi-species cover crops which typically provide a number of agronomic advantages over monocultures.

### **PLANS AND SPECIFICATIONS**

Specifications for implementation of this practice shall be prepared for each field or CMU (Conservation Management Unit).

Customize the language and level of detail in specifications as needed for each particular case. Focus above all on providing the client with the practical guidance needed to effectively put the practice on the ground.

Specifications shall be recorded and conveyed to the client using approved job sheets and/or narrative statements in the conservation plan.

Specifications shall at a minimum include all of the following elements:

1. Identification / description of the field(s) and/or CMU(s) (including number of acres) where cover crop planting will take place.
2. List of the purpose(s) for which the standard is being implemented.

3. Requirements and/or recommendations for cover crop establishment addressing the following issues, as applicable:
  - Soil testing and fertilization.
  - Method of seeding/planting.
  - Species selection.
  - Quality of seed.
  - Time of seeding.
  - Rate of seeding.
4. Requirements and/or recommendations for cover crop management addressing the following issues, as applicable:
  - Mowing, top-dressing, or other in-season management.
  - Whether harvest is acceptable.
  - Termination method.
  - Termination timing.
  - Management of cover crop residues.
5. A statement of what constitutes successful cover crop establishment and/or management, generally expressed as a target for percent cover and/or biomass production.
6. Any additional recommendations that will increase likelihood of successful practice implementation.

Use the practice job sheet to plan and certify this practice.

#### **OPERATION AND MAINTENANCE**

Requirements and recommendations for operation and maintenance (O&M) of this practice shall be provided to every client.

Customize the choice of language and level of detail as needed for each particular case. Focus above all on providing the client with the practical guidance needed to ensure the long-term effectiveness of the practice.

O&M recommendations shall be recorded and conveyed using approved job sheets and/or narrative statements in the conservation plan.

Provide at a minimum the following O&M recommendations:

1. Verify that cover crops are established and performing as desired. Reseed as needed or carry out other in-season management such as weed control, fertilization, etc. to ensure performance targets are achieved.

#### **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.

#### **ATTACHMENT: NRCS Cover Crop Termination Guidelines – Non-Irrigated Cropland**

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