

**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**

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

Refer to “Table 1- Recommended Cover Crops” and the “Cover Crop Zone Map” located in the Field Office Tech Guide when selecting cover crop species and seed mixes.

“Table 1” identifies purposes met by cover crop species and provides seeding rates, depths, planting dates for each. Cover crop species

and seeding mixtures recommended by Penn State may also be selected.

Planting dates are specified in the “Cover Crop Zone Map” for different parts of the state. Planting dates recommended by local Penn State Extension may be followed.

Select species compatible with other components of the cropping system.

Ensure herbicides used with cover crops are compatible with the following crop.

Ensure that plants are not listed as noxious weeds or invasive species for Pennsylvania.

Cover crop residue will not be burned.

For non-irrigated cover crops, the cover crop termination must occur at or before the time periods specified in the publication NRCS Cover Crop Termination Guidelines – *December 2013* (located in the Field Office Tech Guide).

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

Time cover crop establishment in conjunction with other practices, 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.

Determine the amount of surface and/or canopy cover needed from the cover crop using Revised Universal Soil Loss Equation, Version 2 (RUSLE2).

**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.

To maximize plant biomass production, plant as early as possible and terminate as late as feasible considering crop insurance criteria, time required to prepare field to plant the next crop, and soil moisture management.

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

Cover crops will be established and actively growing during 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.

Terminate the cover crop as late as feasible to maximize plant biomass production. Consider the time needed to prepare the field for planting the next crop and soil moisture depletion.

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

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

The specific Rhizobium bacterium 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**

Select cover crop species to achieve one or more of the following: species mix with different maturity dates, attract beneficial insects, provide pollinator forage, 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**

Select cover crop species for chemical or physical characteristics that suppress or compete with weeds.

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

Cover crops residues will be left on the soil surface to maximize allelopathic (chemical) and mulching (physical) effects. A late termination date may be used if the to maximize allelopathic effects.

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.

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

Maintain an actively growing cover crop as late as feasible to maximize plant growth.

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 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.

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

Use deep-rooted species to maximize nutrient recovery.

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 enhance bio-fuels opportunities.

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 sheets, or on other forms.

### OPERATION AND MAINTENANCE

To eliminate competition in following crop, assure full and complete termination of the cover crop.

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

Cover Crop (PA340) Table 1: Recommended Cover Crops. NRCS PA eFOTG Section IV.

Cover Crop (PA340) Map Zones. NRCS PA eFOTG Section IV.

NRCS Cover Crop Termination Guidelines . December 2013. NRCS PA eFOTG Section IV.

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.