

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

COVER CROP

(Acre)

CODE 340

DEFINITION

Crops including grasses, legumes, forbs, or other herbaceous plants established for seasonal cover and conservation purposes.

PURPOSE

- Reduce erosion from wind and water
- Increase soil organic matter
- Capture and recycle or redistribute excess nutrients in the soil profile
- Promote biological nitrogen fixation and reduce energy use
- Increase biodiversity
- Weed suppression
- Soil moisture management
- Minimize and reduce soil compaction
- Protect growing crops from damage by wind-borne soil particles
- Provide supplemental forage

CONDITIONS WHERE PRACTICE APPLIES

On 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, planting methods, termination methods and termination dates will be consistent with approved local criteria and site conditions.

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

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

Do not use plants that are on the state's noxious weed or invasive species lists.

Cover crop residue will not be burned.

In addition to other criteria for non-irrigated cover crop termination, the cover crop termination must be at or before the time periods specified in the attached: NRCS Cover Crop Termination Guidelines—Non-Irrigated Crop. (See Attached).

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 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

NRCS-Minnesota
July 2013

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 periods of nutrient leaching.

Cover crop species will be selected for their ability to take up large amounts of nutrients from the rooting profile of the soil. Use fibrous-rooted cereal grains or grasses to absorb excess nutrients, especially nitrogen. Choose cover crop species that have a rating of 3 or higher for Nitrogen Scavenging on Table 2 of the Minnesota Cover Crop Specification Sheet.

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.

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 the 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 the following cash crop. A late kill may be used if the objectives are to use the cover crop as a biocontrol and maximize the addition of organic matter. The right moment to kill the cover crop will depend on the specific rotation, weather, and objectives.

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.

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.

Increase seeding rates by 15% to provide additional cover that 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.

For long-term weed suppression, reseeding annuals 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.

Some supplemental forage situations may need a minimum stubble height. See the Minnesota Cover Crop Job Sheet Table A for details.

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 optimize 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.

Additional Criteria to Protect Growing Crops from Damage by Wind-borne Soil Particles

Cover crops will be established and growing, or cover crop residue will be upright while the

crop to be protected is at the most vulnerable stage of growth.

Plants selected for cover crops will have the physical characteristics necessary to provide adequate protection to growing crops from wind and wind-borne soil particles.

The cover crop will be terminated as late as feasible to maximize cover crop growth and protection and still not interfere with growth of the crop being protected.

CONSIDERATIONS

Plant cover crop in a timely matter 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 moisture depletion.

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

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

Use deep-rooted species to maximum nutrient recovery.

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

Mixtures of two or more cover crops are often more effective than planting a single species.

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.

You can increase the range of benefits by increasing the diversity of cover crops grown, frequency of use between cash crops and the length of time they are growing.

More fall growth frequently occurs with the larger seeded grain crops. Under dry soil conditions or when unable to plant until after September 1, it will be advantageous to seed rye or winter wheat.

Using mixtures of legumes and other forbs enhances forage opportunities for pollinators.

Use plant species that enhance bio-fuels opportunities.

PLANS AND SPECIFICATIONS

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

- Field number and acres
- Species of plants to be established
- Recommended seeding dates
- Seeding rates
- Establishment procedure
- Planned rates and timing of nutrient application
- Planned dates and method for terminating the cover crop
- Other information pertinent to establishing and managing the cover crop
- Seedbed preparation

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

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

Control weeds in the cover crop by mowing or herbicide application.

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. 3rd 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