

COVER CROP

(Acre)
Code 340

Natural Resources Conservation Service
Conservation Practice Standard

I. Definition

Grasses, legumes, forbs, or other herbaceous plants established for seasonal cover and conservation purposes.

II. Purposes

This practice may be applied as part of a conservation management system to support one or more of the following purposes.

- 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.
- Provide weed suppression.
- Provide supplemental forage.
- Provide soil moisture management.
- Reduce particle emissions into the atmosphere.
- Minimize and reduce soil compaction.
- Protect growing crops from damage by windborne soil particles.

III. Conditions Where Practice Applies

This practice applies on all lands requiring vegetative cover for natural resource protection. For temporary cover of critical sites or land disturbed by construction, see NRCS, Field Office Technical Guide (FOTG), Section IV Standard 342, Critical Area Planting.

IV. Federal, Tribal, State, Local Laws

Users of this standard should be aware of potentially applicable federal, tribal, state and local laws, rules, regulations or permit requirements governing cover crops. This standard does not contain the text of federal, tribal, state, or local laws.

V. Criteria

A. General Criteria

Plant species, seedbed preparation, seeding rates, seeding dates, seeding depths, and planting methods will be consistent with this practice standard and site conditions.

The species selected will be compatible with the nutrient management and pest management provisions of the conservation plan.

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

Herbicides used to terminate cover crops shall be compatible with the following crop.

Cover crop residue will not be burned.

Utilize Table 1 in Wisconsin Agronomy Technical Note 7, Cover and Green Manure Crop Benefits to Soil Quality, to select cover crop plant species and to calculate seeding rates. Other cover crop mixtures not listed in Table 1 may be utilized to address specific planning needs with approval by the State Agronomist or Area Resource Conservationist.

Plants that are listed on the state's noxious or invasive species list shall not be used.

B. 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) identified by the planner.

Plants selected for cover crops will have the physical characteristics necessary to produce adequate root structure and vegetative growth to provide adequate erosion protection during the identified critical erosion period.

The amount of surface and/or canopy cover needed from the cover crop to adequately control erosion shall be determined using the current erosion prediction technology.

C. Additional Criteria to Promote Biological Nitrogen Fixation and Reduce Energy Use

Legumes or legume/grass mixtures shall be used where the objective is to promote biological nitrogen fixation.

Legume seed shall be inoculated with the recommended rhizobia bacteria prior to planting unless there is documented evidence that adequate inoculum exists in the soil.

Nitrogen credits from legume cover crops will be accounted for in the nutrient management plan.

D. Additional Criteria to Manage Excess Nutrients in the Soil Profile

Cover crops will be established and actively growing before expected periods of high precipitation that can cause nutrient leaching.

Cover crop species will be selected for their ability to absorb large amounts of nutrients from the rooting profile of the soil. Use fibrous-rooted cereal grains or grasses to absorb excess nitrogen.

The above-ground biomass shall be removed from the field when maximum nutrient removal efficiency is required.

The cover crop will be killed based on the objectives for managing nutrients in the soil profile. When the objective is to cycle nutrients with the use of a green manure cover crop, the cover crop shall be killed early in the growing season to allow faster nutrient mineralization and to reduce the carbon-to-nitrogen ratio of the vegetative material. This timing allows a better match of the nutrient release with the crop uptake needs.

E. Additional Criteria to Increase Soil Organic Matter

Cover crop species which produce high volumes of organic material and/or root mass shall be selected to maintain or increase soil organic matter levels.

The NRCS Soil Conditioning Index (SCI) procedure will be used to determine the amount

of biomass required to result in a positive trend in soil organic matter levels.

The cover crop will be terminated as late in the growing season as feasible to maximize plant biomass and still allow seedbed preparation for the subsequent crop.

F. 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.

G. Additional Criteria to Weed Suppression

Seeding rate and timing of establishment/termination of cover crops will be planned to provide vigorous competition for target weed species.

Species for the cover crop will be selected for their allelopathic (chemical) or physical competition with weeds.

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

H. 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 to achieve the planned level of resource protection.

I. Additional Criteria for Soil Moisture Management

Terminate growth of the cover crop sufficiently early to conserve soil moisture for the subsequent crop on low available water capacity soils.

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.

J. Additional Criteria for Green Manure Crops

Green manure crops will be incorporated into the soil after they have attained a top growth of 12 to 18 inches. Additional practices to provide protection from wind and water erosion will be implemented as needed after plow-down.

K. Additional Criteria to Reduce Particulate Emissions into the Atmosphere

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

L. Additional Criteria to Minimize and Reduce Soil Compaction

Select and manage cover crop species to maximize production of deep roots and large amounts of surface or root biomass in order to increase soil organic matter, improve soil structure, and increase infiltration.

M. Additional Criteria to Protect Growing Crops from Damage by Windborne Soil Particles

Cover crops will be established and growing, or 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 windborne 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.

VI. Considerations

Additional recommendations relating to the use of this practice which are not required are as follows.

- A. Acceptable benefits, for most purposes, are usually accomplished when the plant density is at least 25 stems per square foot, the combined canopy and surface cover is at least 80 percent, and the above ground (dry weight) biomass production is at least 2700 pounds per acre.
- B. Mixtures of two or more cover crops are often more effective than a single crop.

- C. Consider that grasses utilize more soil nitrogen, and legumes utilize both nitrogen and phosphorus.
- D. Avoid cover crop species that attract potentially damaging insects or diseases.
- E. Cover crops may be used to improve site conditions for establishment of perennial species.
- F. Seed produced by cover crops may provide weed competition to subsequent crops.
- G. For long-term weed suppression, perennials and/or biennial species can be used.
- H. Use plant species that enhance opportunities for pollinators (see Wisconsin Biology Technical Note 8, Pollinator Biology and Habitat).
- I. Use plant species that enhance biofuel opportunities.
- J. Use deep-rooted species to maximize nutrient recovery.

VII. Plans and Specifications

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

- seedbed preparation,
- recommended seeding dates,
- seed mixture(s),
- seeding rates,
- establishment procedure,
- rates and timing of nutrient applications, and
- planned dates and method of terminating the cover crop.

VIII. Operation and Maintenance

Control competition from volunteer plants and shading.

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

Evaluate the condition of the cover crop prior to planting the next crop in the rotation to ensure that the cover crop has been uniformly terminated according to the plan.

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.

IX. References

USDA, NRCS Wisconsin Field Office Technical Guide (FOTG), Section IV, Practice Standards and Specifications.

USDA, NRCS Wisconsin Agronomy Technical Note 7, Cover and Green Manure Crop Benefits to Soil Quality.

USDA, NRCS Wisconsin Biology Technical Note 8, Pollinator Biology and Habitat.

Cover Crops on the Intensive Market Farm, University of Wisconsin – Madison, Center for Integrated Agricultural Systems, College of Agricultural and Life Sciences.

A. Clark 2007. Managing Cover Crops Profitably, 3rd Edition, Sustainable Agriculture Network Handbook Series; Handbook K9.

Magdoff, Fred, and Harold Van Es. Building Soils for Better Crops – Sustainable Soil Management, 3rd Edition, Handbook Series Book 10.

Moyer, Jeff, Organic No-Till Farming – Advancing No Till Agriculture, Crops, Soil, Equipment.