



## Natural Resources Conservation Service

### CONSERVATION PRACTICE STANDARD

## COVER CROP

### CODE 340

#### (ac)

#### I. DEFINITION

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

#### II. PURPOSE

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

- Improve soil health and condition
- Improve soil structure/biodiversity
- Increase soil organic matter
- Manage excess nutrients in the soil
- Minimize and reduce soil compaction
- Promote biological nitrogen fixation
- Reduce wind abrasion damage
- Provide supplemental forage
- Reduce particle emissions
- Reduce water and wind erosion
- Soil moisture management
- Suppress weeds and break pest cycles

#### III. CONDITIONS WHERE PRACTICE APPLIES

This practice applies on all lands requiring seasonal vegetative cover for natural resource protection or improvement.

#### IV. CRITERIA

##### A. General Criteria Applicable to All Purposes

1. Plant species, seedbed preparation, seeding rates, seeding dates, seeding depths, fertility requirements, and planting methods will be consistent with Wisconsin Agronomy Technical Note 7, "Cover and Green Manure Crops". Soil and site conditions will be evaluated.
2. Non-certified seed can be used. At a minimum, cover crop seed must be 85 percent germination.
3. Select species and planting dates that will not compete with the production crop yield or harvest.
4. The cover crop plant species selected will be compatible with the current cropping system, previously applied herbicides, nutrient and pest management plans and other components of the conversation plan.

5. Cover crops shall meet the grower's objective and follow termination guidance in Wisconsin Agronomy Technical Note 7 Cover and Green Manure Crops.
6. Do not burn cover crop residue.
7. When grazing or haying a cover crop follow pesticide label restrictions. Grazing or haying of the cover crop shall not compromise the performance of the crop to meet conservation purposes.
8. Soil testing and nutrient applications are not required for the establishment of cover crops.

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

1. Time cover crop establishment in conjunction with other practices so that the soil will be adequately protected during the critical erosion period(s).
2. Select plants that have the physical characteristics necessary to produce adequate root structure and protect the soil during critical periods.
3. Use the current erosion prediction technology (RUSLE2 or WEPS) to determine the amount of surface and/or canopy cover needed from the cover crop to achieve the erosion objective.

#### **C. Additional Criteria to Maintain or Increase Soil Health and Organic Matter Content**

1. Cover crop species will be selected on the basis of producing higher volumes of organic material and root mass to maintain or increase soil organic matter.
2. The planned crop rotation, including the cover crop management activities, will score a Soil Conditioning Index (SCI) value > 0, as determined using the current approved NRCS SCI procedure.
3. The cover crop shall be planted as early as possible and be terminated as late as practical for the producer's cropping system to maximize and plant biomass production. Allow time to prepare the field for planting the next crop, and to avoid soil moisture depletion.

#### **D. Additional Criteria to Reduce Water Quality Degradation by Utilizing Excessive Soil Nutrients**

1. Cover crops will be established and actively growing before expected periods of high precipitation can cause nutrient leaching.
2. Cover crop species shall be selected for their ability to adsorb large amounts of nutrients from the rooting profile of the soil. Use fibrous-rooted cereal grains or grasses to maximize the utilization of excess nitrogen.
3. Cover crops harvested for feed (hay/balage) shall be suitable for the planned livestock, and capable of removing the excess nutrients present.
4. The above ground biomass shall be removed from the field when maximum nutrient removal efficiency is required. Cover crop termination method and timing shall be determined based on the objectives for managing nutrients in the soil profile. Terminate the cover crop as late as practical to maximize plant biomass production and nutrient uptake.
5. Deep-rooted cover crops shall be used to extract excessive nutrients in the soil profile.
6. Nitrogen credits from legume cover crops shall be accounted for in the following crop year nutrient management plan using current University of Wisconsin recommendations.

#### **E. Additional Criteria to Suppress Excessive Weed Pressures and Break Pest Cycles**

1. Select cover crops for their life cycles, growth habits, and other biological, chemical or physical characteristics to provide one or more of the following:
  - Suppress or compete with weeds such as Allelopathic (chemically suppress), compete for light, moisture, and/or nutrients.
  - Break pest life cycles or suppress plant pests or pathogens.
  - Provide food or habitat for natural enemies of pests.
2. Select cover crop species that do not harbor pests or diseases known to affect subsequent crops in the rotation.

**F. Additional Criteria to Improve Soil Moisture Use Efficiency**

1. In areas of limited soil moisture, terminate sufficiently early to conserve soil moisture for the subsequent crop. Utilize the NRCS Cover Crop Termination Guidelines found in Wisconsin Agronomic Technical Note 7, "Cover and Green Manure Crops" to determine the appropriate timing for termination.
2. Cover crops established for moisture conservation shall be left on the soil surface until the subsequent crop is planted.
3. In areas of potential excess soil moisture, allow the cover crop to grow as long as possible to soil moisture removal.

**G. Additional Criteria to Minimize Soil Compaction**

1. Select cover crop species that have the ability to root deeply and capacity to penetrate or prevent compacted layers, increase soil organic matter, improve soil structure and increase infiltration.

**V. CONSIDERATIONS****General Considerations**

1. Plant cover crops in a timely matter and when there is adequate moisture to establish a good stand.
2. When applicable, ensure cover crops are managed and are compatible with the client's crop insurance criteria.
3. Optimal cover crop benefits 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.
4. Higher density cover crop stands promote rapid canopy closure and greater weed suppression. Increased seeding rates (1.5 to 2 times normal) can improve weed competitiveness.
5. Consider designing cover crop mixtures with at least one grass and one legume.
6. Consider that grasses utilize primarily soil nitrogen, and legumes utilize both soil nitrogen and phosphorus.
7. Consider the use of cover crops to improve site conditions for establishment of perennial species.
8. Consider the risk for seed produced by cover crops to provide weed competition to subsequent crops. Termination of covers may need to be done timely to avoid this risk.
9. Consider the use of plant species that may attract beneficial pollinators. Refer to Wisconsin Biology Technical Note 8, "Pollinator Biology and Habitat" for a list of diverse legumes and other forbs that promote pollinator habitat that can be used in cover crop mixes.
10. Consider the benefits of cover crop species with desired forage traits, and palatable to livestock, that will not interfere with the production of the subsequent crop.
11. Select a mixture of two or more cover crop species from different plant families to achieve one or more of the following: (1) species mix with different maturity dates, (2) attract beneficial insects, (3) attract pollinators, (4) increase soil biological diversity, (5) serve as a trap crop for insect pests, or (6) provide food and cover for wildlife habitat management.
12. Plant legumes or mixtures of legumes with grasses, with other forbs to achieve biological nitrogen fixation. Select cover crop mixture, timing, and method of termination that will maximize efficiency of nitrogen utilization by the following crop. Use University of Wisconsin recommended to capture nitrogen credits from the legume.
13. Time the termination of cover crops to meet nutrient release goals. Termination at early vegetative stages may cause a more rapid release compared to termination at a more mature stage.

**A. Additional Considerations to Reduce Erosion by Wind or Water**

1. To reduce erosion, best results are achieved when the combined canopy and surface residue cover attains 90 percent or greater during the period of potentially erosive wind or rainfall.

### **B. Additional Considerations to Reduce Water Quality Degradation by Utilizing Excessive Soil Nutrients**

1. Use deep-rooted species to maximize nutrient recovery.
2. When appropriate for the crop production system, mowing certain grass cover crops (e.g., sorghumsudan grass, pearl millet) prior to heading and allowing the cover crop to regrow can enhance rooting depth and density, thereby increasing their subsoiling and nutrient-recycling efficiency.

### **C. Additional Considerations to Increase Soil Health and Organic Matter Content**

1. Increase the diversity of cover crops (e.g., mixtures of several plant species) to promote a wider diversity of soil organisms, and thereby promote increased soil organic matter.
2. Plant legumes or mixtures of legumes with grasses, with other forbs to provide nitrogen through biological nitrogen fixation.
3. Legumes add the most plantavailable N if terminated when about 30 percent of the crop is in bloom.

## **VI. PLANS AND SPECIFICATIONS**

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

- Field number and acres,
- Species of plant(s) to be established,
- Seeding rates,
- Seeding dates,
- Establishment procedure,
- Rates, timing and forms of nutrient application (if needed),
- Dates and method of cover crop termination,
- Other information pertinent to establishing and managing the cover crop such as specifics for haying or grazing planning.
- All Specifications shall be recorded using Wisconsin Job Sheet 340, "How to Establish Cover and Green Manure Crops".

## **VII. OPERATION AND MAINTENANCE**

1. 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.
2. Terminate cover crop according to design (timing/method) to prevent negative impact on primary crop.
3. Maintain adequate biomass on the soil surface to meet the intended use of the practice, when the cover crop will be grazed or harvested.

## **VIII. FEDERAL, TRIBAL, STATE AND 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.

## **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". USDA, NRCS Wisconsin Job Sheet 340, "How to Establish Cover and Green Manure Crops".

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.

Midwest Cover Crop Council: <http://www.mccc.msu.edu/>

Midwest Cover Crop Decision Tool: <http://mcccdev.anr.msu.edu/VertIndex.php>

NRCS Cover Crop Termination Guidelines: <http://efotg.sc.egov.usda.gov/references/public/UT/CoverCropTerminationGuidelines.pdf>

UW Extension Publications: Cover Crop Termination, Forage Herbicide Quick Sheet – Cereal Rye Forage after Corn Silage, Forage Herbicides Quick Sheet – Spring-Seeded Forages after Corn and Herbicide Rotation Restrictions in Forage and Cover Cropping Systems located at the Wisconsin Crop Weed Science Website: <http://wcws.cals.wisc.edu>.