

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

COVER CROP

(Ac.)

CODE 340

DEFINITION

Grasses, legumes, and forbs planted for seasonal vegetative cover.

PURPOSE

This practice is applied to support one or more of the following purposes:

- Reduce erosion from wind and water.
- Maintain or increase soil health and organic matter content.
- Reduce water quality degradation by utilizing excessive soil nutrients.
- Suppress excessive weed pressures and break pest cycles.
- Improve soil moisture use efficiency.
- Minimize soil compaction.

CONDITIONS WHERE PRACTICE APPLIES

All lands requiring seasonal vegetative cover for natural resource protection 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 applicable local criteria and soil/site conditions. [See Iowa Agronomy Technical Note 38 "Cover Crop Management"](#).

Select species that are compatible with other components of the cropping system.

Ensure herbicides used with crops are compatible with cover crop selections and purpose(s). See Iowa State University, Weed

Science publication "[Effect of Residual herbicides on Cover Crop Establishment](#)".

All pesticides must be applied according to product label and to federal, state and local regulations.

Cover crops may be established between annual row crops or terminated perennial crops. Cover crops are planted in a manner to extend the season of living plant matter on cropland. Planting may be completed before a crop is harvested (interseeding) or as soon as possible after harvest of the primary crop. Select species and planting dates that will not interfere with harvest, crop yield, and provides the greatest natural resource concern benefits.

The District Conservationist with approval from the Area Resource Conservationist may extend the seeding date by 2 weeks if growing conditions are favorable.

Do not burn cover crop residue.

After a cover crop has been established no full width tillage will be allowed on the field until the cover crop is ready for termination.

Determine the method and timing of termination to meet the grower's objective and the current [NRCS Cover Crop Termination Guidelines](#).

When a cover crop will be grazed or hayed ensure that crop selection(s) comply with pesticide label rotational crop restrictions and that the planned management will not compromise the selected conservation purpose(s). See Iowa State University publication Crop 3082 "[Herbicide use may restrict grazing options for Cover Crops](#)".

If the cover crop will be harvested for feed (hay/balage/etc.), choose species that are suitable for the

Conservation practice standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact your Natural Resources Conservation Service [State Office](#) or visit the [Field Office Technical Guide](#).

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planned livestock, and capable of removing the excess nutrients present.

Do not harvest cover crops for seed. This would be considered double cropping and not a cover crop by Risk Management Agency (RMA).

If the specific rhizobium bacteria for the selected legume are not present in the soil, treat the seed with the appropriate inoculum at the time of planting.

Additional Criteria to Reduce Erosion from Wind and Water

Time the cover crop establishment in conjunction with other practices to adequately protect the soil during the critical erosion period(s). This is achieved when the combined canopy and surface residue cover attains 90 percent or greater during the period of potentially erosive wind or rainfall.

Select cover crops that will have the physical characteristics necessary to provide adequate erosion protection.

Use the current erosion prediction technology to determine the amount of surface and/or canopy cover needed from the cover crop to achieve the erosion objective.

Additional Criteria to Maintain or Increase Soil Health and Organic Matter Content

Cover crop species will be selected on the basis of producing high carbon loading. Increased plant material from above ground vegetation and below ground root mass increase the carbon contributions to the soil to maintain or increase soil organic matter. Winter hardy grains contribute more carbon due to their higher C:N ratio.

The planned crop rotation including the cover crop and associated management activities will score a Soil Conditioning Index (SCI) value > 0, as determined using the current approved NRCS Soil Conditioning Index (SCI) procedure, with appropriate adjustments for additions to and or subtractions from plant biomass.

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 plant biomass production, considering crop insurance criteria, the time

needed to prepare the field for planting the next crop, and soil moisture depletion.

Additional Criteria Reduce Water Quality Degradation by Utilizing Excessive Soil Nutrients

Establish cover crops as soon as practical prior to or after harvest of the production crop.

Select cover crop species for their ability to effectively utilize nutrients. Broadleaf species can be nitrogen users but if they winter kill they release nitrogen too soon that it is vulnerable to loss unless accompanied by a grass species that is winter hardy.

Terminate the cover crop as late as practical to maximize plant biomass production and nutrient uptake.

Additional Criteria to Suppress Excessive Weed Pressures and Break Pest Cycles

Select cover crop species for their life cycles, growth habits, and other biological, chemical and or physical characteristics to provide one or more of the following:

- To suppress weeds, or compete with weeds.
- Break pest life cycles or suppress of plant pests or pathogens.
- Provide food or habitat for natural enemies of pests.
- Release compounds such as glucosinolates that suppress soil borne pathogens or pests.

Select cover crop species that do not harbor pests or diseases of subsequent crops in the rotation.

Select planting methods to insure a uniform stand throughout the field. Select species that will over winter to shade out winter annuals and other early emerging annual weeds. Delay termination to increase the C:N ratio in the plant to slow breakdown of the residue in the spring for longer weed control.

Additional Criteria to Improve Soil Moisture Use Efficiency

In areas of limited soil moisture, terminate growth of the cover crop sufficiently early to conserve soil moisture for the subsequent crop. When we have adequate spring

moisture greater cover crop growth will maximize cover crop residue that will help to preserve soil moisture throughout the growing season. Additionally the cover crop when complemented with long term no-till, will enhance soil structure and macro pore development allowing heavy precipitation events to infiltrate into the soil where it can be stored vs. running off. .

In areas of potential excess soil moisture, allow the cover crop to grow as long as possible to maximize soil moisture removal. For soils that are high in clay content and are typically difficult to plant due to wet conditions living cover crops can help to dry out the soil and improve soil macro pores that help the soil aerate. For these areas terminate the cover crop as close to planting as possible or shortly after. If the cover crop is terminated before it will no longer take up water and the additional residue could hinder the soil from drying out.

Additional Criteria to Minimize Soil Compaction

Select cover crop species that have the ability to root deeply and the capacity to penetrate or prevent compacted layers.

CONSIDERATIONS

Plant cover crops in a timely matter and when there is adequate moisture 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 to optimize soil moisture.

Select cover crops that are compatible with the production system, well adapted to the region's climate and soils, and resistant to prevalent pests, weeds, and diseases. Avoid cover crop species that harbor or carry over potentially damaging diseases or insects.

Cover crops may be used to improve site conditions for establishment of perennial species.

When cover crops are used for grazing, select species that will have desired forage traits, be palatable to livestock, and not interfere with the production of the subsequent crop.

Use plant species that enhance forage opportunities for pollinators by using diverse legumes and other forbs.

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.

To suppress weeds select species that will overwinter. These species will help shade out winter annuals, marehail, and other early emerging annual weeds such as giant ragweed. Delaying termination will also create additional residue to that will deter weed germination. Delaying termination of our winter hardy grains will increase the C:N ratio in the plant and this will slow breakdown of the residue giving us longer weed control.

Additional Considerations to Reduce Erosion by Wind or Water

Delay termination in spring to increase soil protection without reducing crop yield. Considerations for determining termination date may include crop insurance criteria, the amount of time needed to prepare the field for planting the next crop, weather conditions, and cover crop effects on soil moisture and nutrient availability to the following crop.

Additional Considerations to Reduce Water Quality Degradation by Utilizing Excessive Soil Nutrients

Use deep-rooted species to maximize nutrient recovery.

When appropriate for the crop production system, mowing certain grass cover crops (e.g., sorghum-sudangrass, 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 efficacy.

Plant legumes or mixtures of legumes with grasses, crucifers, and/or other forbs to

achieve biological nitrogen fixation. Select cover crop species or mixture, and timing and method of termination that will maximize efficiency of nitrogen utilization by the following crop, considering soil type and conditions, season and weather conditions, cropping system, C:N ratio of the cover crop at termination, and anticipated nitrogen needs of the subsequent crop. Use Iowa State University recommended nitrogen credits from the legume and reduce nitrogen applications to the subsequent crop accordingly. "If the specific rhizobium bacteria for the selected legume are not present in the soil, treat the seed with the appropriate inoculum at the time of planting.

Time the termination of cover crops to meet nutrient release goals. Termination at early vegetative stages may cause a more rapid release of nutrients compared to termination at a more mature stage. If terminating cover crops at a more mature stage consider using Nitrogen as a starter/pop up application so Nitrogen is available early to the growing crop and not tied up in the decomposition of the cover crop.

Both residue decomposition rates and soil fertility can affect nutrient availability following termination of cover crops

Legumes add the most plant-available N if terminated when about 30% of the cover crop is in bloom.

Additional Considerations to Increase Soil Health and Organic Matter Content

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.

Plant legumes or mixtures of legumes with grasses, crucifers, and/or other forbs to provide nitrogen through biological nitrogen fixation.

Additional Considerations to Suppress Excessive Weed Pressures and Break Pest Cycles

Cover crops may be selected to provide food or habitat for natural enemies of production crop pests.

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

Seed a higher density cover crop stand to promote rapid canopy closure and greater weed suppression. Increased seeding rates (1.5 to 2 times normal) can improve weed suppression.

Cover crops may be selected that release biofumigation compounds that inhibit soil-borne plant pests and pathogens.

Species can be selected to serve as trap crops to divert pests from production crops.

Allelopathic effects to the subsequent crop should be evaluated when selecting the appropriate cover crop.

PLANS AND SPECIFICATIONS

Prepare plans and specifications for each field or treatment unit according to the planning criteria and operation and maintenance requirements of this standard. Specifications shall describe the requirements to apply the practice to achieve the intended purpose for the practice site. Plans for the establishment of cover crops shall, at a minimum, include the following specification components in the Iowa Cover Crop, 340, Job Sheet document:

- 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 to terminate the cover crop.
- Other information pertinent to establishing and managing the cover crop e.g., if haying or grazing is planned specify the planned management for haying or grazing.

OPERATION AND MAINTENANCE

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.

NRCS Cover Crop Termination Guidelines: <http://www.nrcs.usda.gov/wps/port>

[al/nrcs/detail/national/climatechange/?cid=stelprdb1077238](http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/tools/rusle2/)

Revised Universal Soil Loss Equation Version 2 (RUSLE2)
website: <http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/tools/rusle2/>

Wind Erosion Prediction System (WEPS)
website: <http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/tools/weps/>

USDA, Natural Resources Conservation Service, National Agronomy Manual, 4th Edition, Feb. 2011.
Website: <http://directives.sc.egov.usda.gov/UnderManualsandTitle190IowaAgronomyTechnicalNote38CoverCropManagement>
Website: [Technical Notes | NRCS Iowa](#)

Iowa Agronomy Technical Note 39
“Recommended Cover Crop Seeding Methods and Tools” [Technical Notes | NRCS Iowa](#)

Iowa Agronomy Technical Note 36
“Interseeding of Cover Crops” [Technical Notes | NRCS Iowa](#)