

**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.

Addressing the resource concern LIVESTOCK PRODUCTION LIMITATION – Inadequate Feed and Forage, is not a purpose of this practice standard. Refer to Forage and Biomass Planting (512) for annual planted forages, specifically those that are planned to be harvested for hay and/or forage.

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. Table I in the General

Specifications and the OK-ECS Worksheet 7 contain guidance for plant descriptions, characteristics, seeding rates, and dates.

Plant cover crops in a timely manner and when there is adequate moisture to establish a good stand.

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.

Ensure herbicides used with crops are compatible with cover crop selections and purpose(s).

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

Cover crops may be established between successive production crops, or companion-planted or relay-planted into production crops. Select species and planting dates that will not compete with the production crop yield or harvest.

Cover crop residue will not be burned or removed as hay or silage. Cover crops will not be harvested for grain or seed.

Determine the method and timing of termination to address resource concern, meet the grower's objective, and be compatible with the producers crop insurance guidelines. The current NRCS Cover Crop Termination Guidelines located in 340 Cover Crop of Section IV eFOTG.

When a cover crop will be grazed ensure that crop selection(s) comply with pesticide label rotational crop restrictions and that the planned management will not compromise the selected

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](#).

NRCS, OK
September 2016

conservation purpose(s). Select species that will have desired forage traits, be palatable to livestock, and not interfere with the production of the subsequent crop.

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

Ensure that plants are not listed as noxious weeds or invasive species for a particular state.

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).

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.

Plants selected for cover crops will have the physical characteristics necessary to provide adequate protection. Refer to **NRCS National Agronomy Manual** table for **Estimated Crop Tolerances to Blowing Soil** for more information on protecting specific crops.

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

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.

The planned crop rotation including the cover crop and associated management activities will score both overall Soil Conditioning Index (SCI) value > 0 and SCI for organic matter 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 to 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. (i.e. before or after harvest)

Select cover crop species for their ability to effectively utilize nutrients.

To maximize biomass production and nutrient uptake, terminate the cover crop prior to developing seed. Practical considerations for 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 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 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.

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

A late termination may be used if the objectives are to use cover crop as a biocontrol.

Additional Criteria to Improve Soil Moisture Use Efficiency

Species will be selected on their ability to cover the soil surface and provide long lasting residue after termination.

If snow catch is an objective, select tall, strong stemmed species which will remain upright over winter.

Terminate growth of the cover crop sufficiently early to conserve soil moisture for the subsequent crop. Do not incorporate cover crop residue following termination.

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 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.

Multiple species from different functional groups (brassica, legume, grass) should be included to utilize both taproots and fibrous root systems. At least one deep taproot species will be included.

Tillage will not be used for cover crop termination.

CONSIDERATIONS

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.

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

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

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

Increased seeding rates (1.25 to 2 times normal) can improve weed-competitiveness by promoting rapid canopy closure and greater 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.

A mixture of two or more cover crop species from different plant families may be selected 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.

Including legumes, or mixtures of the legumes with grasses, brassicas, and/or other forbs can 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 Land Grant 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 compared to termination at a more mature stage.

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

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

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

For use of cover crop as green manure to cycle nutrients, factors such as the carbon/nitrogen ratios may be considered to terminate early to mineralize nutrients faster and match release of nutrient with uptake by following cash crop.

Additional Considerations to Reduce Erosion by Wind or Water

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 critical wind or water erosive periods using RUSLE2 or WEPS.

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.

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, brassicas, and/or other forbs to provide nitrogen through biological nitrogen fixation.

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, as a minimum, include the following specification components in an approved Cover Crop, 340, Implementation Requirements 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.
- RUSLE2 or WEPS reports

NRCS, OK

September 2016

- Other information pertinent to establishing and managing the cover crop e.g., soil nutrient test analysis, depth to restrictive layer, or if grazing is planned specify the planned management for grazing.
- Use OK-ECS- Worksheet 7 for planning and certification of seed mix.

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/portal/nrcs/detail/national/climatechange/?cid=stelprdb1077238>
- 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/> Under Manuals and Title 190.

Ball, D.M, Hoveland, C.S., and Lacefield, G.D. Southern Forages. 2nd Ed. Potash and Phosphate Institute. Norcross, GA

Caddel, J., Redfearn, D., Zhang, H., Edwards, J., and Deng, S,. Forage Legumes and Nitrogen Production. OSU Extension Fact Sheets F-2590. Stillwater, OK. Cooperative Extension Service, Oklahoma State University. 5 pages.

Caddel, J. and Enis, J., Forage Legumes for Oklahoma. OSU Extension Fact Sheet PSS-2585. Stillwater, OK. Cooperative Extension Service, Oklahoma State University, 6 pages.

Edwards, J., Warren, J., and Redfearn. OSU Extension Fact Sheet PSS-2071. Stillwater, OK Cooperative Extension Service, Oklahoma State University. 3 pages.