NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD AND SPECIFICATIONS

COVER CROP

(Acre)
CODE 340

DEFINITION

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

PURPOSES

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

- Reduce erosion from wind and water.
- Increase soil organic matter.
- Manage excess nutrients in the soil profile.
- Promote biological nitrogen fixation.
- Increase biodiversity.
- Suppress weeds.
- Provide supplemental forage.
- Manage soil moisture.

CONDITIONS WHERE PRACTICE APPLIES

On all lands requiring vegetative cover for natural resource protection.

CRITERIA

General Criteria Applicable to All Purposes

Plant species, seedbed preparation, seeding rates, seeding dates, seeding depths, and planting methods shall be selected to meet the objectives of the landowner and the environmental site conditions.

Seed must be clean, relatively free of weed seed and other contaminants, and comply with the Federal Seed Act and the Missouri State Seed Law. Seed that has become wet, moldy, or otherwise damaged in transit or storage is not acceptable.

Plant cover crops seeds at proper depth for fast emergence. The proper depth is 1/4 to 1/2 inches deep for legumes and grasses such as annual ryegrass and up to 1 and 1/2 inches for cereal grains. If the seed is applied by a broadcast method, the area will be rolled or culti-packed immediately after seeding on a prepared seedbed only. If the seed is broadcast into heavy residue or a growing crop, the seeding rate will be increased by 50 percent, and rolling or culti-packing are not required.

Species selected shall be compatible with the nutrient management and pest management provisions of the conservation plan. Herbicides used with a cover crop will be compatible with the following crop. Refer to Crop Replant and Rotation Guides in UMC Publication MP-575, “Weed Control Guide for Missouri Field Crops”.

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

Do not incorporate the cover crop prior to one month before planting the next crop. If the next crop is to be planted with no-till operations, control the cover and green manure crop with herbicides to eliminate competition while maintaining the benefits of surface residue for erosion control.

Cover crop residues will not be burned.

Winter Cover following Row Crop Production
If seeding the cover crop prior to harvest of the primary crop, select an appropriate plant species and seeding rate from Table I. Broadcast the seed by a method that allows for good coverage of the area and does the least amount of crop damage to the standing crop. Seeding dates should be from August 15 to September 15 or prior to leaf drop of the primary crop. No seedbed preparation is necessary.

If seeding the cover crop after harvest of the primary crop, select plant species, seeding rate, seeding dates, and planting method from Table I. Seed may be planted either no-till or broadcast into existing residue cover.

Summer Cover Crops
Select a seed mixture, seeding rates, and planting dates from Table II. Select species that provide desired benefits as a nurse crop, temporary cover, and/or green manure crop.

Prepare the seedbed for planting the cover crop. If the site is currently producing crops, site preparation may not be necessary. If the site is to be seeded to temporary cover to stabilize the soil resource, site preparation, seedbed preparation, and seeding shall meet the requirements of the CRITICAL AREA PLANTING (342) standard.

Cover Crops for Orchards, Vineyards, and Nurseries
Apply fertilizer and lime according to a current soil test to meet needs of the cover crop. Incorporate the soil amendments to a depth of three inches while preparing a suitable seedbed.

Plant either winter rye, winter triticale, or winter wheat. Planting dates will be from August 1 through October 15 in northern Missouri and August 15 through November 1 in southern Missouri.

Additional Criteria to Reduce Erosion from Wind and Water

Cover crop establishment will be timed so that the soil will be adequately protected during the critical erosion periods for wind and water.

Plant species selected for the cover crop will have the physical characteristics necessary to provide adequate protection to the site.

The amount of surface and canopy cover needed for the cover crop shall be determined using current erosion prediction technology.

Temporary protection of critical eroding sites may be obtained by planting a cover crop. Grass or grain crops such as spring oats, winter wheat, winter rye, winter triticale, sudangrass, and annual ryegrass provide excellent canopy and ground cover for erosion reduction and provide excellent wind disruption at the soil surface.

If the site is to be seeded to a permanent cover, select a temporary cover crop that can be managed to improve site conditions for the planned cover.

Additional Criteria to Increase Soil Organic Matter

Cover crop species will be selected on the basis of producing high volumes of organic material to maintain or improve soil organic matter.

Soil Conditioning Index (SCI) procedures will be used to determine the amount of biomass required for this purpose.

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

Additional Criteria to Manage Excess Nutrients in the Soil Profile

Cover crop will be established and actively growing before expected periods of high precipitation that can cause leaching of mobile nutrients.

Cover crop species will be selected for the ability to use large amounts of nutrients from the rooting depth of the soil profile. Deep-rooted species provide maximum nutrient recovery.

The aboveground biomass will be removed from the field for maximum nutrient removal.

Additional Criteria to Promote Biological Nitrogen Fixation

The specific *Rhizobia* bacteria species will either be present in the soil, or the seed will be inoculated at the time of planting a legume cover

crop. If the specific legume crop has not been grown on the soil in the past two years, inoculum will be added to the seed.

Rhizobia strains are specific to a group of legumes or a specific legume species. Select and use the proper inoculum for the species to be planted. The inoculum will be mixed with the seed and applied during the planting operation. For best results, moisten the seed with a binder or sticking compound to help adhere the inoculum to the seed. Acceptable binders are commercially available or use a solution of water and 10 percent corn syrup or sugar.

The nitrogen credit from legume crops will be accounted for in the nutrient management plan.

Additional Criteria to Increase Biodiversity

Cover crop species will be selected to 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.

Additional Criteria to Suppress Weeds

Cover crop species will be selected for their chemical or physical competition with weeds.

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

For long-term benefits of weed suppression, perennial 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, grazed, or cut for silage as long as sufficient biomass is left for resource protection.

Additional Criteria to Manage Soil Moisture

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 until the subsequent crop is planted.

In areas of potentially excess soil moisture, allow the cover crop to grow as long as possible to optimize soil moisture removal.

CONSIDERATIONS

Cover crops decrease runoff and increase infiltration. The increase in organic matter will normally increase water holding capacity.

The cover crop should be terminated as late as feasible to maximize plant growth and still allow preparation of the seedbed for the subsequent crop.

Winter rye, winter triticale, and winter wheat are vigorous, competitive cover. These species overwinter and require herbicides or tillage to kill them prior to seed set.

Spring oats, sudangrass, and annual ryegrass will winterkill. Time the planting of these cover crops to reduce the need for mowing or clipping.

Grasses including the cereal grains are more winter-hardy than legume crops and should be used for fall plantings. Grasses are competitive and generally require a higher level of management. Grasses respond favorably to available nitrogen.

Legumes although less winter-hardy provide benefits over grasses. The carbon-nitrogen ratio of legume residue is less than grasses and breaks down faster. Legumes utilize available nitrogen and phosphorus.

The maximum benefit of legumes is obtained if seeded early enough to grow prior to the on-set of cold weather. Legumes are ideal to plant after the harvest of winter wheat.

Allelopathy effects have been documented with certain cereal grains. These crops produce chemical substances that inhibit the growth or establishment of following crops. Light tillage is often used to reduce allelopathy.

Incorporation of the cover crop is not necessary. Incorporation will speed-up the recovery of nitrogen, offer weed control options, or improve

stand establishment. Incorporation also removes or reduces surface residue and increases the potential for soil erosion. Tillage will also stimulate emergence of weed seedlings.

Grazing is a management tool that may be used to improve nutrient cycling particularly with cereal grains. Grazing may also be used to manage residue amounts prior to planting the next crop.

PLANS AND SPECIFICATIONS

Site specifications for establishment and maintenance of this practice shall be prepared for each field or treatment unit according to the Criteria, Considerations, and Operation and Maintenance described in this standard.

Site specifications shall be recorded using approved specification sheets, job sheets, narrative statements in the conservation plan, or other acceptable documentation.

OPERATION AND MAINTENANCE

Prevent the cover crop from producing viable seed by mowing, cutting for hay or silage, grazing, or applying selective herbicides. Do not harvest below the stubble height needed for resource protection.

Delayed planting of spring crops is not recommended. The cover crop should be controlled up to two weeks prior to the normal planting date of the next planned crop.

REFERENCES

MU Guide G4271 “Prevention and Control of Damage from Wind Erosion in Cotton”

Table I – Winter Cover Crop

Plant Species	Seeding Rate1/ (lb. / ac.)	Plant Suitability Zones 2/ and Seeding Dates	
		North	***South***
Cereal Grains:			
Winter Rye 3/	50	8/01 – 10/15	8/15 – 10/31
Winter Triticale 3/	80	8/01 – 10/15	8/15 – 10/31
Winter Wheat 3/	60	8/01 – 10/15	8/15 – 10/31
Spring Oats 4/	65	8/15 – 9/15	8/15 – 9/30
Legumes:			
Hairy Vetch 5/	44	8/15 – 9/15	8/15 – 9/30
Ladino Clover	2	8/15 – 9/15	8/15 - 9/30
Crimson Clover	6	8/15 – 9/15	8/15 – 9/30
Mixtures:			
Hairy Vetch and	15	8/15 – 9/15	8/15 – 9/30
Oats or Rye	40		

Table II – Summer Cover Crop

Plant Species	Seeding Rate 1/ (lb. / ac.)	Plant Suitability Zones 2/ and Seeding Dates	
		North	***South***
Spring Oats	65	3/15 – 5/31	3/01 – 5/15
Annual Ryegrass 6/	4	3/15 – 6/15	3/01 – 5/31
Sudangrass	16	4/15 – 6/15	4/01 - 5/31
Red Clover 6/ and	2	3/15 – 5/31	3/01 – 5/15
Oats	30		
Cover Crop over seeded in fall seeded small grains:			
Red Clover 6/	3	12/01 – 3/15	1/01 – 2/29

Table III – Wind Erosion Control on Cotton Fields
By Planting the Furrows between Established Beds

Plant Species	Seeding Rate 1/ (lb. / ac.)	Plant Suitability Zones 2/ and Seeding Dates	
		North	***South***
Winter Wheat	30	8/01 – 10/15	8/15 – 10/31
Winter Rye	25	8/01 – 10/15	8/15 – 10/31

Footnotes:

1/ If using aerial seeding or other broadcast method to apply seed without rolling or culti-packing, increase seeding rates by 50 percent.

2/ Plant Suitability Zones: North Zone is all counties north of Bates, Henry, Benton, Morgan, Moniteau, Cole, Osage, Gasconade, Franklin, and St. Louis Counties. South Zone is all counties including and south of those listed.

3/ Winter varieties of Rye, Triticale, and Wheat are easy to establish and economical but very competitive. They may be used only as a cover crop and not as a nurse or companion crop. Rye is the most tolerant to both wet and dry conditions and poor fertility and matures two to three weeks earlier than wheat. These cover crops **must** be killed in the spring with tillage or herbicides.

4/ Fall planted spring oats is an economical cover crop to establish. Spring oats will winter kill and not compete for spring moisture.

5/ Hairy Vetch is a vigorous winter annual that produces well on moist soils. It is best suited for Southern Missouri. **Caution:** Hairy Vetch serves as a host plant for the soybean cyst nematode and army worm.

6/ Seeding rate based on pure live seed (PLS).