

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

**COVER CROP
(acre)**

CODE 340

DEFINITION

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

PURPOSES

- Reduce erosion from wind and water
- Increase soil organic matter
- Manage excess nutrients in the soil profile
- Promote biological nitrogen fixation
- Increase biodiversity
- Weed suppression
- Provide supplemental forage
- Soil moisture management

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 will be consistent with approved local criteria and site conditions. Recommended cover crops are found in Table 1.

Winter annual grasses and legumes shall be sown just prior or immediately after harvest of the primary crop.

Overseeding prior to harvest is an acceptable method for establishing winter cereals, annual ryegrass, hairy vetch, and various clovers in standing grain crops.

Legume seeds will be inoculated with the appropriate *Rhizobia* where the legume(s) have not been grown on the site within the last five years.

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

Cover crops will be terminated by harvest, frost, mowing, tillage, and/or herbicides in preparation for the following crop unless a living mulch is desired.

Winter cereals generally should be terminated not later than late joint or early boot stage. Most cover crops should be terminated no later than 2-4 weeks prior to planting the succeeding crop unless a living mulch is desired.

Herbicides used with cover crops will be compatible with the following crop.

Cover crop residue will not be burned.

When broadcasting into heavy residue (> 50% ground cover) or a growing crop increase seed rates by 50%.

**NRCS, IL
July 2002**

Additional Criteria to Reduce Erosion From Wind and Water

Plants selected for cover crops will have the physical characteristics necessary to provide adequate protection.

Rapid germination, vigorous growth, and uniform soil coverage are key characteristics for species selected for erosion control.

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).

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

Additional Criteria to Promote Biological Nitrogen Fixation

The specific *Rhizobia* bacteria will either be present in the soil or the seed will be inoculated at the time of planting legumes.

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

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 leaching.

Cover crop species will be selected for their ability to absorb large amounts of nutrients from the rooting profile of the soil.

Cover crops sown for residual nutrient absorption will be terminated at a time that will allow for the mineralization of the absorbed nutrients during the period of active growth of the subsequent crop.

When the primary purpose of the cover crop(s) is to remove excess plant nutrients in the soil, the aboveground biomass will be removed from the field.

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.

Cover crops will be managed and fertilized to attain maximum biomass production.

The NRCS Soil Conditioning Index (SCI) procedure will be used to estimate the amount of biomass required.

The cover crop will be terminated as late as feasible to maximize plant biomass and still adequately prepare the field for the subsequent crop.

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.

Additional Criteria for Weed Suppression

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

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

For long-term weed suppression, perennials 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 or grazed as long as sufficient biomass is left for resource protection.

Additional Criteria for Soil Moisture Management

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 potential excess soil moisture, allow the cover crop to grow as long as possible to optimize soil moisture removal.

CONSIDERATIONS

The cover crop should be terminated as late as feasible to maximize plant growth and residual nutrient accumulation, while allowing sufficient time for the cover crop to decompose, release nutrients, and recharge soil moisture.

Deep-rooted species provide maximum nutrient recovery.

Avoid cover crop species that attract potentially damaging insects.

Acceptable benefits, for most purposes, are usually accomplished when the plant density is at least 25 stems per foot, the combined canopy and surface cover is at least 60 percent, and the above ground (dry weight) biomass production is at least 2700 lb/acre.

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

Consider potential carryover of herbicides when selecting cover crop species.

Consider cover crop establishment methods that minimally disturb the soil.

Consider negative and positive effects on crop pest populations when selecting cover crop species.

Consider the potential for nitrate and/or prussic acid poisoning when using *Sorghum* cover crops for livestock forage.

Seed produced by cover crops may provide weed competition to subsequent crops.

PLANS AND SPECIFICATIONS

Site specifications for establishing and maintaining the practice will be prepared for each conservation treatment unit. Specifications can be recorded in narrative format, on job sheets, or forms designed to provide specific requirements for the practice. Items to be documented include:

- Seedbed preparation
- Seeding dates
- Seed mixture(s)
- Fertilization
- Management, and
- Time and methods of managing the cover crop residue

OPERATION AND MAINTENANCE

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

REFERENCES

- Bollero, G.A., D.G. Bullock. 1994. Cover Cropping systems for the Central Corn Belt. J. Prod. Agric. 7:55-58.
- Cavigelli, M. A., S.R. Deming, L.K. Probyn and R.R. Harwood (eds.). 1998. Michigan Field Crop Ecology: Managing Biological Processes for Productivity and Environmental Quality. Michigan State University Extension Bulletin E-2646, 92 pp.
- Cavigelli, M. A., S.R. Deming, L.K. Probyn and D.R. Mutch (eds.). 1998. Michigan Field Crop Ecology and Management. Michigan State University Extension Bulletin E-2704, 108 pp.
- Eckert, D.J. 1988. Rye cover crops for no-tillage corn and soybeans. J. Prod. Agric. 1:207-210.
- Hargrove, W.L., (ed.), 1991. Cover Crops for Clean Water. Proceedings, International Conference, April 9-11, 1991, Jackson,

Tennessee. Soil and Water Conservation Society, Ankeny, IA.

Managing Cover Crops Profitably, 2nd ed., 1998. Sustainable Agriculture Network, Handbook Series No. 3., 212 pp.

Sullivan, P. and S. Diver. 2001. Overview of cover crops and green manures. ATTRA, Fayetteville, AR.

Table 1. Common Cover Crops

Species	Seeding rate (Lbs./ac)		Seeding Dates ²	Seeding Depth (inches)	Total Nitrogen ¹ (Lbs./ac)	Dry matter yield (Lbs./ac)	Residual Nitrogen Recovery	Remarks
	Drilled	Broadcast						
Wheat	60-120	60-150	LSum-MF	1/2-1 1/2		3000-7000	Very Good	Easily established.
Rye	56-112	112-168	LSum-MF	1/2-1 1/2		3000-10000	Excellent	Easily established. Rapid growth in fall and spring. Allelopathic properties
Oats	64-100	100-130	ESpr, LSum-EF	1/2-1 1/2		2000-10000	Very Good	Easily established. Winter kills.
Annual Ryegrass	12-20	15-25	ESpr, LSum-MF	1/4-1/2		2000-9000	Very Good	Easily established
Buckwheat	35-60	60-100	Spr-LSum	1/2-1 1/2		2000-3000	Poor	Summer smother crop. Residue degrades rapidly
Oilseed radish	15-25	20-30	EF	1/2-3/4		4000-9000	Good	May lower population of some nematode species. Should not precede or follow other cruciferous crops.
Sorghum-Sudangrass (Sudax)	20	20-40	LSpr-LSum	1/2- 1 1/2		8000-10000	Excellent	Mowing when stalks are 3-4 feet high increases root mass significantly
Hairy vetch	15-20	20-30	ESpr or EF	1/2-1 1/2	90-200	2300-5000	Fair	Commonly planted with winter cereals.
Berseem Clover	8-12	15-20	ESpr or EF	1/4-1/2	75-220	6000-10000	Very Good	Very versatile cover crop. Winter kills.
Red Clover	8-10	10-12	LSum or ESpr	1/4-1/2	70-150	2000-5000	Very Good	Easily established
White Clover	3-9	5-14	LW-LSpr or EF	1/4-1/2	80-200	2000-6000	Fair	Easily established
Crimson Clover	15-20	20-30	Esum or Lsum	1/4-1/2	70-130	3500-5500	Good	Easily established
Sweet Clover	6-10	10-20	ESpr-LSpr or EF	1/4-1.0	90-170	3,000-5000	Fair	Deeply penetrating taproot during second year of growth

Footnotes:

1. Nitrogen content of roots and shoots.

2. E=Early, M=Mid, L=Late, Spr=Spring, Sum=Summer, F=Fall, W=Winter