

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



CRITERIA

General Criteria Applicable to All Purposes

Follow all federal, state and local laws and regulations.

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.

Fertilizer, lime and other soil amendments shall be applied according to soil test recommendations or expected needs of the crops to be grown.

Species selected shall be compatible with the nutrient management and pest management provisions of the conservation plan.

CONDITIONS WHERE PRACTICE APPLIES

On all lands requiring vegetative cover for natural resource protection.

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

Plant cover crop seeds at proper depth for fast emergence. The proper depth is ¼ to ½ inches deep for legumes and grasses such as annual ryegrass and up to 1½ inches for cereal grains. If the seed is applied by a broadcast method on a prepared seedbed, the area will be rolled or cultivated immediately after seeding.

Seed must be clean, relatively free of weed seed and other contaminants. Seed that has become wet, moldy, or otherwise damaged in transit or storage is not acceptable.

Cover crops will be terminated by harvest, frost, crimpers, mowing, tillage, and/or herbicides in preparation for the following crop. Herbicides used with a cover crop will be compatible with the following crop. Follow all federal, state and local laws and regulations and manufacturers label with all herbicides.

Control the cover crop with herbicides to eliminate competition while maintaining the benefits of surface residue for erosion control if the next crop is to be planted with no-till operations. Herbicides shall be compatible with subsequent crop. Cover crop residues will not be burned.

Winter Cover for 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 1. 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 shall be prior to leaf drop on the primary crop. No seedbed preparation is necessary.

If seeding the cover crop after harvest of the primary crop, select plant species, seeding rate, and seeding dates from Table 1. Seed may be either no-till or broadcast seeded into existing residue cover.

Summer Cover Crops

Select a seed mixture, seeding rates, and planting dates from Table 2. 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 NRCS FOTG Critical Area Planting (342) Standard.

Cover Crops for Orchards, Vineyards, and Nurseries

Fertilizer and amendments shall be compatible with specialty crop being grown.

Plant winter rye, winter triticale, or winter wheat as indicated in Table 1.

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.

If the site is to be seeded to a permanent cover, select a temporary cover crop that will be managed to improve site conditions for the planned permanent 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. These would include winter wheat, winter rye and winter triticale and planted as indicated in Table 1.

Soil Conditioning Index 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

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and still allow proper 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. These would include species listed in Table 1.

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 or use a non-diet cola.

The nitrogen credit from the legume crop 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.

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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 shall be used.

Additional Criteria to Provide Supplemental Forage

Species selected will meet the nutritional needs and objectives of the livestock consuming the harvested or grazed forage and not interfere with the production of the subsequent crop. See Table 3 for recommended species.

Cover crops used for supplemental forage to extend the grazing season shall be a part of and included in a prescribed grazing plan.

Sufficient biomass will be left to provide adequate erosion protection for the site after being hayed, grazed, or cut for silage.

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 onset of cold weather. Legumes are ideal to plant after the harvest of winter wheat.

Allelopathic effects have been documented with 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.

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, sudan-grass, and

annual ryegrass provide excellent canopy and ground cover for erosion reduction and provide excellent wind disruption at the soil surface.

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.

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.

No operation and maintenance plan is required.

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

REFERENCES

Purdue Extension Publication ID-317 – Forage Field Guide, 2003

National Range & Pasture Handbook, 1997

Noble Foundation Publication CG-83, Research and Demonstration about using crabgrass as a forage, 1994

Forages 5th Edition; Barnes, Miller & Nelson, 1995

RUSLE 2 (Soil Conditioning Index)

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Table 1 - Winter Cover Crop

Plant Species	Seeding Rate (lbs/Ac)	Seeding Dates	
		North of I-70	South of I-70
Cereal Grains:			
Winter Rye	60	8/1 to 10/15	8/15 to 10/31
Winter Wheat	60	FFD _{1/} to 10/15	FFD to 10/31
Spring Oats	60	8/15 to 9/15	8/15 to 9/30
Winter Triticale	75	8/1 to 10/15	8/15 to 10/31
Legumes:			
Hairy Vetch	30	8/15 to 9/15	8/15 to 9/30
Mixtures:			
Hairy Vetch and Cereal Grain	20/40	8/15 to 9/15	8/15 to 9/30
Other:			
Rape/Canola	4 drilled, 8 broadcast	3/15 to 7/15	3/1 to 8/1

^{1/} Not to be planted prior to Fly Free Date (FFD) as indicated on Table 4.

Table 2 - Summer Cover Crop

Plant Species	Seeding Rate (lbs/Ac)	Seeding Dates	
		North of I-70	South of I-70
Spring Oats	60	3/15 to 5/31	3/1 to 5/15
Annual Ryegrass	20	3/15 to 6/15	3/1 to 5/31
Sudan-grass & Sorghum Sudan	20	4/15 to 6/15	4/1 to 5/31
Red Clover (spring seeded)	3-6	3/15 to 5/31	3/1 to 5/15
Red Clover (Frost-seeded into fall planted small grains)	4-6	12/15 to 3/15	12/15 to 2/15
Buckwheat	30-50	6/15 to 7/15	7/1 to 8/1

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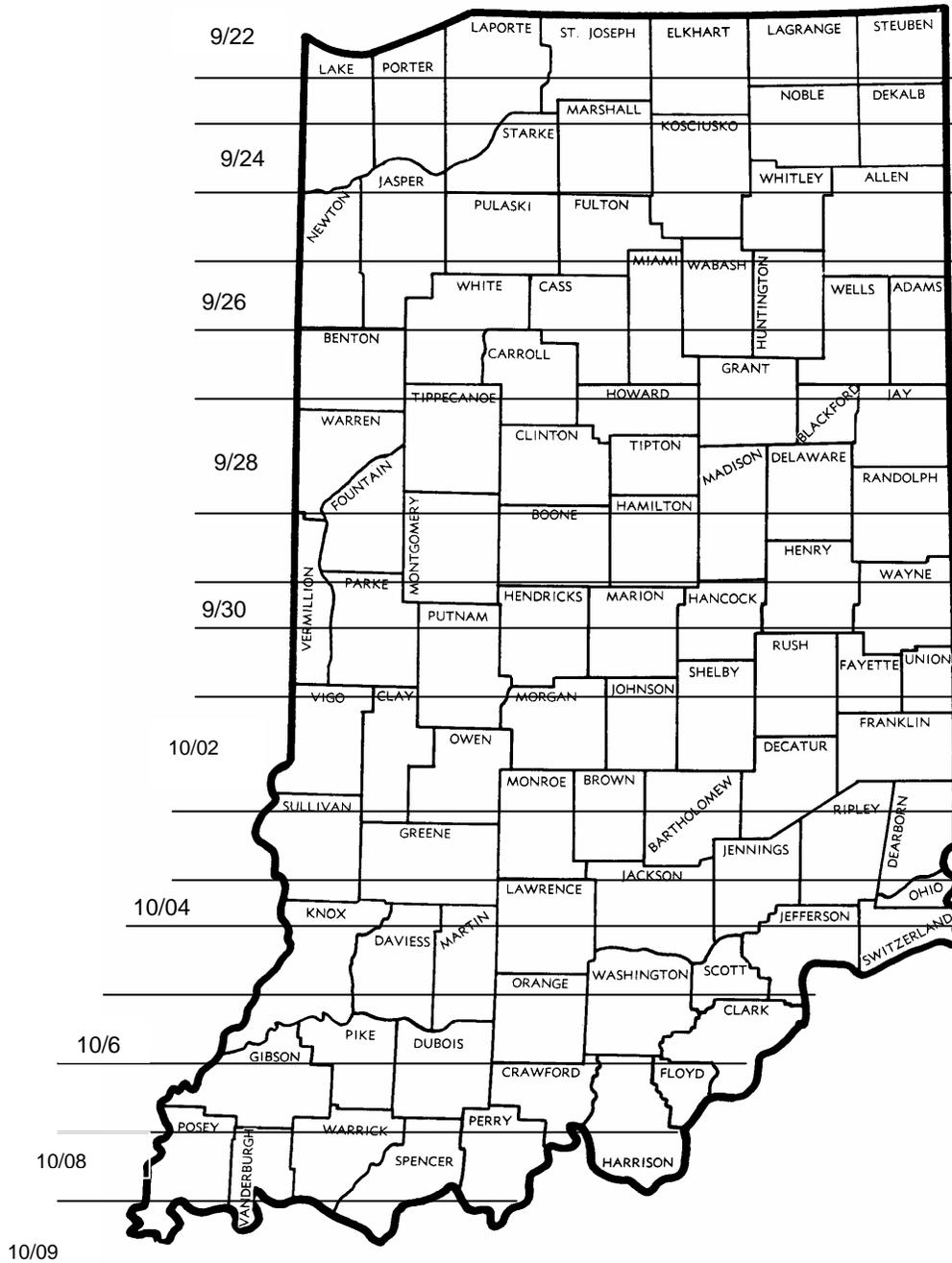
Table 3 - Supplemental Forage for Livestock

Plant Species	Seeding Rate (lbs/Ac)	Seeding Dates	
		North of I-70	South of I-70
Spring Oats	50-60	3/15 to 5/31	3/1 to 5/15
		8/15 to 9/15	8/15 to 9/30
Annual Ryegrass	20	3/15 to 6/15	3/1 to 5/31
Sudan-grass & Sorghum Sudan	20	4/15 to 6/15	4/1 to 5/31
Red Clover (spring seeded)	3-6	3/15 to 5/31	3/1 to 5/15
Winter Rye	60	8/1 to 10/15	8/15 to 10/31
Winter Wheat	60	FFD ^{1/} to 10/15	FFD to 10/31
Winter Triticale	75-120	8/1 to 10/15	8/15 to 10/31
Turnips	4	3/15 to 9/1	3/1 to 8/15
Rape/Canola	4 drilled, 8 broadcast	3/15 to 7/15	3/1 to 8/1
Kale	4	3/15 to 7/15	3/1 to 8/1
Millet	15	3/15 to 7/15	3/1 to 8/1
Italian Ryegrass	40	3/15 to 7/15	3/1 to 8/1
		8/1 to 10/15	8/15 to 10/31
Perennial Ryegrass	40	3/15 to 7/15	3/1 to 8/1
		8/1 to 10/15	8/15 to 10/31
Crabgrass (<i>Digitaria ciliaris</i>)	5	5/15 to 6/15	5/1 to 7/1

^{1/} Not to be planted prior to Fly Free Date (FFD) as indicated on Table 4.

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Table 4. Indiana Fly Free Seeding Dates for Winter Wheat



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