

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

COVER CROP

(Ac.)

CODE 340

DEFINITION

Crops including grasses, legumes and forbs for seasonal cover and other conservation purposes.

PURPOSE

1. Reduce erosion from wind and water.
2. Increase soil organic matter content.
3. Capture and recycle or redistribute nutrients in the soil profile.
4. Promote biological nitrogen fixation.
5. Increase biodiversity.
6. Weed suppression.
7. Provide supplemental forage.
8. Soil moisture management.
9. Reduce particulate emissions into the atmosphere.
10. Minimize and reduce soil compaction.

CONDITIONS WHERE PRACTICE APPLIES

On all lands requiring vegetative cover for natural resource protection and or improvement.

CRITERIA

General Criteria Applicable to All Purposes

1. Plant species, seedbed preparation, seeding rates, seeding dates, seeding depths, fertility requirements, and planting methods will be consistent with the Appendix-A Seeding Tables located at http://www.oh.nrcs.usda.gov/technical/ohio_eFOTG.html, under Section IV, D. Appendices.
2. The species selected will be compatible with other components of the cropping system.
3. Cover crops will be terminated by harvest, frost, mowing, tillage, crimping, and/or herbicides in preparation for the subsequent crop.
4. Herbicides used with cover crops will be compatible with the subsequent crop.
5. Do not use species that are on the state's noxious weed or invasive species lists.
6. Cover crop residue will not be burned.

Additional Criteria to Reduce Erosion from Wind and Water

1. 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).
2. Plants selected for cover crops will have the physical characteristics necessary to provide adequate protection.
3. The amount of surface and/or canopy cover needed from the cover crop shall be determined using current erosion prediction technology.

Additional Criteria to Increase Soil Organic Matter Content

1. Cover crop species will be selected on the basis of producing high volumes of organic material and or root mass to maintain or improve soil organic matter.
2. The NRCS Soil Conditioning Index (SCI) procedure will be used to determine the amount of biomass required to have a positive trend in the soil organic matter subfactor.
3. The cover crop will be terminated as late as feasible to maximize plant biomass production, considering the time needed to prepare the field for planting the next crop and soil moisture depletion.

Additional Criteria to Capture and Recycle Excess Nutrients in the Soil Profile

1. Cover crops will be established and actively growing before the expected period(s) of nutrient leaching.
2. Cover crop species will be selected for their ability to take up large amounts of nutrients from the rooting profile of the soil.
3. When used to redistribute nutrients from deeper in the profile up to the surface layer, the cover crop will be killed in relation to the planting date of the subsequent crop. If the objective is to best synchronize the use of cover crop as a green manure to cycle nutrients, factors such as the carbon/nitrogen ratios may be considered to kill early and have a faster mineralization of nutrients to match release of nutrient with uptake by subsequent cash crop. A late kill may be used if the objectives are to use as a biocontrol and maximize the addition of organic matter. The right moment to kill the cover crop will depend on the specific rotation, weather and objectives.

Additional Criteria to Promote Biological Nitrogen Fixation

1. Only legumes or legume-grass mixtures will be established as cover crops.
2. The specific Rhizobium bacteria for the selected legume will either be present in the soil or the seed will be inoculated at the time of planting.

Additional Criteria to Increase Biodiversity

1. Cover crop species shall be selected that have different maturity dates, attract beneficial insects, increase soil biological diversity, serve as a trap crop for damaging insects, and/or provide food and cover for wildlife habitat management.

Additional Criteria for Weed Suppression

1. Species for the cover crop will be selected for their chemical or physical characteristics to suppress or compete with weeds.
2. Cover crops residues will be left on the soil surface to maximize allelopathic (chemical) and mulching (physical) effects.
3. For long-term weed suppression, reseeding annuals and/or biennial species can be used.

Additional Criteria to Provide Supplemental Forage

1. Species selected will have desired forage traits, be palatable to livestock, and not interfere with the production of the subsequent crop.
2. 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

1. 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.
2. 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 Reduce Particulate Emissions into the Atmosphere

1. Manage cover crops and their residues so that at least 80% ground cover is maintained during planting operations for the subsequent crop.

Additional Criteria to Minimize and Reduce Soil Compaction

1. 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.

CONSIDERATIONS

1. Plant cover crop in a timely matter to establish a good stand.
2. 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 moisture depletion.
3. Use deep-rooted species to maximize nutrient recovery.
4. Grasses to utilize more soil nitrogen and legumes utilize both nitrogen and phosphorus.
5. Avoid cover crop species that harbor or carryover potentially damaging diseases or insects.
6. For most purposes for which cover crops are established, the combined canopy and surface cover is at nearly 90 percent or greater, and the above ground (dry weight) biomass production is at least 4,000 lbs/acre.
7. Cover crops may be used to improve site conditions for establishment of perennial species.
8. Use plant species that enhance bio-fuels opportunities.
9. Use plant species that enhance forage opportunities for pollinators.
10. Grass cover/green manure crops (especially cereal rye) are more effective in utilizing excess nitrogen remaining from the previous crop. The aboveground biomass may be removed from the field for maximum nutrient removal efficiency.
11. Cereal rye will grow longer in the fall and begin growth earlier in the spring than wheat.
12. An aerial seeded oats cover crop into soybeans (seeded prior to harvest) can add additional residue cover without the need to kill the cover crop in the following spring.

13. Aerial seeded cover crops into soybeans, especially wheat, rye, and oats, are best if seeded prior to soybean leaf drop. This generally occurs the last week of August to mid-September. **DO NOT SEED WHEAT PRIOR TO THE FLY SAFE DATE TO AVOID AN INFESTATION OF THE HESSIAN FLY. DO NOT USE TREATED SEED WHEN BROADCASTING OR AERIAL SEEDING INTO A STANDING CROP.**
14. Aerial seeded wheat or cereal rye into corn is best if seeded during the early dent stage. This generally occurs the last week of August to mid-September. **DO NOT SEED WHEAT PRIOR TO THE FLY SAFE DATE TO AVOID AN INFESTATION OF THE HESSIAN FLY. DO NOT USE TREATED SEED WHEN BROADCASTING OR AERIAL SEEDING INTO A STANDING CROP.**
15. Grass type cover/green manure crops should be considered when a legume crop, e.g. soybeans, is planned following the cover crop.
16. Legume type cover/green manure crops should be considered when a grass crop, e.g. corn, is planned following the cover crop.
17. To avoid a "green bridge" effect, it is critical that grass cover/green manure crops be controlled or killed when planting a grass crop such as corn. Grass cover crops, especially cereal rye, can produce an allelopathic effect and can serve as a host for pests and diseases that can slow the germination and growth of corn and other grass crops. It is best to kill the grass cover crop soon enough to allow a two week period of dead cover prior to planting the corn (grass) crop.
18. Hairy Vetch and clovers can serve as a host to the Soybean Cyst Nematode (SCN). Consider alternative cover crops when SCN is a concern in the rotation. Other SCN host plants include: henbit, common mullen, wild mustard, chickweed, pokeweed, and canola.
19. Aerial seeded and early no-till established cover crops provide more erosion control the year of establishment.
20. Cover crops established after considerable soil disturbance in the fall or seeded after October 10th can cause more erosion during the year of establishment than if no cover crop were planted.
21. Cover crops should be considered on fields following corn silage to reduce wind and water erosion and to replace organic matter losses.
22. Cover crops following corn silage or soybeans generally provide most of their erosion protection the spring (year) after establishment when allowed to mature to the heights specified in the criteria. No till and mulch till systems compliment the use of cover crops.

PLANS AND SPECIFICATIONS

Plans and specifications will be prepared for the practice site. Plans for the establishment of cover crops shall include:

1. Species or species of plants to be established.
2. Seeding rates.
3. Recommended seeding dates.
4. Establishment procedure.
5. Planned rates and timing of nutrient application.
6. Planned dates for destroying cover crop.
7. Other information pertinent to establishing and managing the cover crop.

Plans and specifications for the establishment and management of cover crops may be recorded in narrative form, on job sheets, or on other forms.

OPERATION AND MAINTENANCE

1. Control growth of the cover crop to reduce competition from volunteer plants and shading.
2. Control weeds in cover crops by mowing or by using other pest management techniques.
3. Control soil moisture depletion by selecting water efficient plant species and terminating the cover crop before excessive transpiration.

REFERENCES

Bowman, G., C. Cramer, and C. Shirley. A. Clark (ed.). 1998. Managing cover crops profitably. 2nd ed. Sustainable Agriculture Network Handbook Series; bk 3. National Agriculture Library. Beltsville, MD.

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.

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| Practice Documentation For: | <i>Cover Crop - 340</i> |
| The following documentation must be in the case folder or engineering subfolder. | |
| Practice Planning | |
| <ol style="list-style-type: none"> 1. Is the practice part of a conservation plan? 2. Have the purpose(s) for the practice been identified? 3. Is the location of the practice identified on a map or plan drawing? | |
| Practice Design | |
| <p>Have the following design criteria been addressed?</p> <ol style="list-style-type: none"> 1. Seeding mixture, rate, timing, and method of establishment. 2. Timing or maturity of the cover before tillage or killing of the cover. 3. The amount of cover (% or pounds) expected from the cover. | |
| Practice Installation / Application | |
| <p>Does the practice meet the minimum criteria for the planned purpose(s)?</p> <p>Have the following criteria been documented in the assistance notes or practice jobsheet?</p> <ol style="list-style-type: none"> 1. Type of cover established. 2. Condition of the cover. 3. Acres established. | |
| Practice Deficiencies | |
| <p>If applicable, have the practice deficiencies been communicated with the decisionmaker?</p> | |
| Practice Maintenance | |
| <p>Have the following maintenance actions been communicated to the decisionmaker?</p> <ol style="list-style-type: none"> 1. Control growth of the cover crop to reduce competition from volunteer plants and shading. 2. Control weeds in cover crops by mowing or by using other pest management techniques. 3. Control soil moisture depletion by selecting water efficient plant species and terminating the cover crop before excessive transpiration. | |
| Other Comments: | |