

NATURAL RESOURCES CONSERVATION SERVICE  
VIRGINIA 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 seasonal 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 local site conditions and in accordance with this standard.

The species selected will be compatible with the nutrient management and pest management plans.

Cover crops will be terminated by a killing frost, harvesting, mowing, tillage, and/or by herbicides in preparation for planting the subsequent crop. Cover crops (excluding non-cropland) should be killed at least 1 week or incorporated into the soil at least 3 weeks prior to planting the subsequent crop if by conventional methods. NOTE: Kill or plow down cover crop early enough to allow time to plant the subsequent crop during its optimum planting period.

Herbicides used on cover crops will be compatible with the subsequent crop. All pesticides should be applied according to the Virginia Conservation Practice Standard *Pest Management (Code 595)*, label directions, and in accordance with Virginia Pest Management Guide recommendations.

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

Cover crop residue will not be burned.

### Establishment of Cover Crop

#### A. General

Select cover crops which possess as many of the following traits as possible:

1. Adaptable to the geographic region
2. Germinates and emerges relatively fast
3. Tolerant to adverse climatic and soil conditions
4. Is competitive
5. Provides good weed suppression
6. Has a relatively high dry matter yield
7. Has potential use as pasture or hay
8. Has a relatively low seed cost
9. Is compatible with the proposed cropping system.

Inoculate all legumes with appropriate inoculant.

NOTE: Legume seeds shall be inoculated within one hour prior to planting time with the correct inoculant. If more than one legume is being seeded, the correct inoculant for each legume must be used. Use two times the recommended rate of inoculant. Also, include a medium recommended by the manufacturer to bond the inoculant to the seed. The inoculant and/or the inoculated seed shall be protected from the sun and excessive heat at all times. The inoculant shall not be used beyond its expiration date.

#### B. Annual Cover Crops

Apply lime and fertilizer in accordance with a current soil test. NOTE: Apply adequate amounts of phosphorous and potassium to meet the needs of both the cover crop and the subsequent crop, if applicable. This is also an excellent time to apply lime needed by the primary crop in the rotation.

DO NOT apply excessive amounts of nitrogen if cover crop is established to recover residual nitrogen.

Topdress with additional nitrogen if maximum biomass is an objective, and the cover crop consists of all or at least 75 percent non-legume; and a leaching problem does not exist.

Apply lime and fertilizer prior to seedbed preparation for conventional seeding. NOTE: If cover crops are interseeded into existing crops, apply needed lime and fertilizer after crop harvest.

Prepare seedbed as needed for conventional seeding by plowing and disking, by disking only, or by using other suitable tillage implements. Incorporate required lime and/or fertilizer into the top 3 (three) to 6 (six) inches of soil as a part of seedbed preparation. All required seedbed preparation should be performed just prior to and in conjunction with seeding/planting operations.

NOTE: DO NOT prepare a smooth, fine seedbed unless it is anticipated that the cover crop may be harvested for hay or no-till planting of the following crop is proposed. Otherwise, some soil surface roughness is desirable to decrease rainfall runoff and associated soil loss.

Perform the seeding operation by broadcasting (follow with light harrowing), by drilling, or by using a cultipacker/seeder. NOTE: Seeding rates should be increased when broadcasting.

Seed should be placed to a depth of 1/4 to 1/2 inch depending on seed size and soil texture. Seeding depth should be closer to 1/2 inch on sandy soils and/or for larger size seeds. Do not exceed a depth of 1 inch for all conditions. Firm the seedbed with a cultipacker after seeding unless a cultipacker seeder is used.

NOTE: Establishing cover crops into the stubble of the previous crop using no-till methods is acceptable. However, adequate planning needs to be done well in advance to assure a relatively smooth and weed free soil surface at time of planting. Surface apply required lime and/or fertilizer.

Refer to the *Plant Establishment Guide for Virginia* for species selection, rates, and recommended seeding dates.

#### C. Perennial Cover Crops (for orchards or other lands)

For orchards, vineyards, and nurseries, permanent vegetative covers are usually preferred. Grass/legume mixtures provide the

best soil protection and provide stable support for equipment used in these farm operations. It is best to establish cover 1 to 2 years in advance and strip-kill the cover with herbicides or cultivation prior to planting the trees, vines, or shrubs. NOTE: Herbicides must not have any carryover effect.

Apply lime and fertilizer according to a current soil test.

Perform seedbed preparation and seeding operations as appropriate for site conditions. Refer to criteria notes under the General and Annual Cover Crop sections for establishment guidance.

NOTE: If conventional seeding methods are used to establish cover in existing orchards, vineyards, and nurseries, disturb the soil surface only to a depth to successfully destroy the existing vegetation, and at the same time create a satisfactory seedbed. DO NOT operate seedbed preparation implements at a depth, which could cause root damage.

Refer to the *Plant Establishment Guide for Virginia* for species selection, rates, and recommended seeding dates.

#### ADDITIONAL CRITERIA TO REDUCE EROSION FROM WIND AND WATER

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).

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

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

This use, commonly known as “green manure” has selected adaptability for soil and land uses benefiting from high volumes of organic matter to improve soil tilth. Examples are vegetable crops, crop fields recently brought into cultivation, and extremely light excessively drained soils.

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

The cover crop will be terminated as late as feasible to maximize plant biomass and still allow ample time to prepare the seedbed for the subsequent crop.

#### ADDITIONAL CRITERIA TO MANAGE EXCESS NUTRIENTS IN THE SOIL PROFILE

Use of this practice should be encouraged on soils with high leaching indices.

Cover crops will be established and actively growing prior to 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.

Plan in advance to permit seeding of fall cover crops as early as possible to maximize residual soil nitrogen uptake. NOTE: Non-legume cover crops such as cereal grains (rye is most common and most effective, followed in decreasing effectiveness by wheat, barley and oats) are recommended to utilize residual nitrogen.

The aboveground biomass may be removed from the field for maximum nutrient removal efficiency; consequently, harvesting or grazing these cover crops will maximize N removal from the soil.

## 340-VA-4

Tissue testing and state of the art nutrient monitoring (Nitrogen Quick Test) should be used to determine nutrient levels, cycling potential, and future nutrient inputs.

### ADDITIONAL CRITERIA TO PROMOTE BIOLOGICAL NITROGEN FIXATION

The specific Rhizobia bacteria will either be present in the soil, or legume seeds will be inoculated at the time of planting.

Legume cover crops such as clovers, peas, vetch, soybeans and alfalfa may be selected to add nitrogen reserves to the soil. Note: Nitrogen credits from legume cover crops will be accounted for in the nutrient management plan.

Nitrogen credits should be used according to the Virginia Conservation Practice Standard *Nutrient Management (Code 590)* and the Virginia Nutrient Management Handbook of the Virginia Department of Conservation and Recreation to prevent over-application of nitrogen. Note: Tissue testing is advised to determine nutrient content.

Plan in advance to permit seeding of cover crop as early as possible to maximize the nitrogen fixation period. NOTE: The amount of N the cover crop will provide and how fast it will become available depends on the species of cover crop and growth stage when killed or plowed under, and the amount of available N in the soil. Legume N fixation is reduced by 2.5 lbs. for every pound of available soil N; therefore, to maximize the N fixation, precede the cover crop with a crop that will use as much available soil N as possible. In general, approximately 1/2 of the legume N will be available to the succeeding crop the first year. The remaining N is released at varying rates during the next few years. NOTE: How long benefits last have not been documented.

### 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

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

For long-term weed suppression, use perennial or biennial species.

### ADDITIONAL CRITERIA TO PROVIDE SUPPLEMENTAL FORAGE

Species selected will:

- Have desired forage traits
- Be palatable to livestock
- 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 (erosion control, nutrient uptake).

### ADDITIONAL CRITERIA FOR SOIL MOISTURE MANAGEMENT

Terminate growth of the cover crop in a timely manner early enough to conserve soil moisture for the establishment of the subsequent crop. This is especially important for lighter sandy soil types.

Residue of cover crops established for moisture conservation shall be left on the soil surface until the subsequent crop is planted.

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

## CONSIDERATIONS

Consider the following potential benefits when evaluating the use of cover crops:

- Vegetative cover on the soil surface minimizes the detachment of soil particles by raindrop impact, slows rate of runoff to allow more time for infiltration of water into the soil profile, reduces compaction from heavy rains, and reduces soil loss. Minimizing soil loss on cropland will also minimize the potential amount of sediment, which could be deposited in storm water conveyance measures, drainageways and streams.
- Reduction of fertilizer cost by providing a portion of the nutrients to succeeding crops.
- Reduction of herbicide costs by suppressing weeds (some, such as cereal rye, contain compounds called allelopaths which retard or prevent the growth of certain other plants).
- Reduction of fuel cost (deep-rooted plants will help break up plow/hardpans which usually cause greater tillage resistance).
- If used consistently in a well planned cropping sequence, may minimize or prevent the creation of compaction zones; and/or may minimize any adverse effects related to naturally occurring restrictive soil layers.
- Increases moisture-holding capacity of the soil, which will decrease the amount of irrigation required.
- Reduction of insects, because cover crops will serve as non-host plants and disrupt their life cycle.
- Reduction of soilborne diseases, and nematodes because non-host plants are included in the cropping sequence.
- Some cover crops have deep roots, which can utilize nutrients not reached by other crops.
- Improves soil tilth.
- Minimizes ground water pollution, due to the fact that cover crops take up and store residual N from previously applied manure and commercial fertilizers, (cool season

grasses such as annual ryegrass and cereal rye are good examples).

- A cover crop may need to be added into an existing rotation (grain crops) after a drought period or other low crop yield conditions to scavenge residual nitrogen left in the soil profile.
- With continued use over time, may increase soil organic matter. (The amount of increase, if any, will be determined by factors such as cover species, management conditions, types and degree of tillage, types of other crops in the rotation, cropping sequence, soil types, climatic conditions and geographic location.)
- Amount of biomass produced generally provides desired residue levels for conservation tillage.

The cover crop should be terminated as late as feasible to maximize plant growth and still provide adequate time to prepare the seedbed for the subsequent crop.

Grasses will utilize more soil nitrogen, and legumes will utilize both nitrogen and phosphorus.

Avoid cover crop species that attract damaging insects.

Acceptable benefits 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 dry matter biomass production is at least 2700 LB/acre. NOTE: Eighty percent coverage should be the goal.

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

Consider the type of seeding equipment required and its availability to the landuser when providing recommendations on which species of cover to establish.

Consider the landuser's objective and cropping system when providing cover crop recommendations.

If cover crop is to be grazed as supplemental forage; the species, timing of planting, and grazing period should be carefully balanced to produce desired forage needs.

## PLANS AND SPECIFICATIONS

Specifications for installation and maintenance of this practice shall be prepared according to the Criteria, Considerations, and Operation and Maintenance described in this standard and shall be recorded on approved specification sheets and job sheets, and as narrative statements in conservation plans.

As a minimum, record and maintain the following data:

1. Farm and Tract number
2. Field number
3. Acres
4. Objective of cover crop
5. Amount of lime and fertilizer
6. Cropping Sequence
7. Species and seeding rate
8. Seeding method
9. Date of seeding
10. Soil loss reduction calculations if the objective is for erosion control

## OPERATION AND MAINTENANCE

1. Monitor site as necessary to determine establishment rate. Re-seed if necessary to assure a minimum 80% cover within 30 days.
2. Apply additional nitrogen to non-legume species, if excessive rainfall occurs during the growth period, and/or it is visually apparent that a deficiency is present. NOTE: A vigorous stand is important if the objectives of a cover crop are to be met; however, do not apply excessive nitrogen if nutrient assimilation is the main objective.

3. Evaluate the cover crop on an on-going basis to determine if landuser objectives are being met. NOTE: Encourage the selection and use of untried plant species, which may be included in a specific cropping rotation.
4. For permanent cover crops in orchards, vineyards and nurseries:
  - a) Strip-kill the cover 1 to 2 feet around the main stems of the production crop with cultivation equipment that will not damage the crop roots, or with acceptable herbicides.
  - b) Mow the remaining cover periodically to reduce weeds, insects and other pests, and to promote growth for uniform coverage.
  - c) Soil test every 3 to 4 years and apply needed lime and fertilizer.

## REFERENCES

1. Virginia Pest Management Guide, published by the Virginia Cooperative Extension Service (Most current publication, i.e., current year).
2. Nutrient Management Handbook, Virginia Division of Soil and Water Conservation.
3. Lime and Use, Virginia Cooperative Extension Service.
4. Soil Fertility Guide, Virginia Cooperative Extension Service.
5. Virginia Conservation Practice Standard *Nutrient Management (Code 590)*.
6. "The New Farm's Cover Crop Guide" (1988), by the New Farm, 222 Main St., Emmaus, Pa. 18098.
7. "Cover Crops and Green Manures", by Otto Scmid and Ruedi Kley, 1984. ATTRA, P. O. Box 3657, Fayetteville, AR. 72702
8. "Managing Cover Crops Profitably", produced by Rodale Institute, Emmaus, Pa. USDA, 342 Aerospace Center, Washington, DC 20250-2200.

9. *Plant Establishment Guide for Virginia*, USDA, NRCS, Richmond, Virginia.
10. "Cover Crops for Clean Water", W. L. Hargrove, Editor, Proceedings, International Conference, April 9-11, 1991, Jackson, Tennessee. Published by Soil and Water Conservation Society.
11. "Small Grain Cover Crop Management for Maximum Economic and Environmental Benefits", Virginia Cooperative Extension Publication 424-019.
12. "Cover Crops: A Paragon for Nitrogen Management" by Russell Brinsfield and Kenneth Staver, University of Maryland, Wye Research and Education Center, Queenstown, Maryland.

**NATURAL RESOURCES CONSERVATION SERVICE  
VIRGINIA CONSERVATION PRACTICE STANDARD**

**COVER CROP**

**Approved Practice Narrative**

**(Acre)**

**(CODE 340)**

340 D1 Cover Crop: Establish a cover crop of small grain, grass, legume or a combination of species. Follow establishment procedures set forth in the Virginia Conservation Practice Standard and specifications provided.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326 W. Whitten Building, 14<sup>th</sup> and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.