United States Department of Agriculture
Natural Resources Conservation Service

2014 Ranking Period 1

Soil Quality Enhancement Activity – SQL12 – Intensive cover cropping in annual crops

Enhancement Description
Grow and manage *seasonal* cover crops of grasses, legumes or forbs to maintain soil coverage and other conservation benefits during all the non-crop production periods in an annual crop rotation. Intensive cover cropping is applicable to conventional, specialty and organic crop production systems.

Landuse Applicability
Crop

Benefits
Using seasonal cover crops during all non-production periods between annually produced crops reduces wind and water erosion. When managed appropriately for local conditions, cover crops can restore and maintain soil productivity and soil quality over a wide range of climates and crop species. Cover crops restore and maintain soil properties by increasing organic matter, relieving compaction, improving soil tilth and fertility, fixing nitrogen (legumes), recycling nutrients in the soil profile, breaking pest cycles and providing habitat for soil biota, such as beneficial bacteria, mycorrhizal fungi and earthworms.

Conditions Where Enhancement Applies
This enhancement applies to all acres of annually planted cropland. These acres can be organic, transitioning to organic, or non-organic.

Criteria
Implementation of this enhancement requires the use of cover crops to provide soil coverage during the non-crop production periods of the rotation. To minimize periods of soil exposure, plant cover crops as soon as practical after harvest of each production crop. Use cover crop species appropriate to the season and seeding as well as seeding rates and methods that will yield a uniform stand and rapid ground coverage. Cover crops may be seeded into standing production crops provided seeding rates and methods, soil moisture levels and other environmental conditions are adequate to yield a satisfactory cover crop stand.

For the purposes of this enhancement, the cover crop shall not be harvested or grazed.

Each cover crop in the rotation shall meet the criteria for a least one of the following purposes. Over the duration of the crop rotation, cover crops shall be utilized to meet two or more of the criteria.

1. High bio-mass cover crops for erosion control and increased soil organic matter improvement.

   a. Plant a cover crop with a growth potential to produce a minimum of 3,000 lbs/acre (dry weight) above ground bio-mass when terminated by seasonal temperature changes (frost or heat), mechanical action (mowing, tillage, crimping, etc.) and/or herbicides in preparation for the following crop. Use seeding rates and row spacing (for drilled cover crop) that will provide rapid canopy closure and adequate ground coverage to prevent erosion between production crops, with a minimum of 90% cover by the time of cover crop termination.
   b. Leave the entire biomass in the field (i.e., do not harvest or graze the cover crop)
   c. Growth potential lists and recommended seeding rates and methods for selected cover crops are available in "Managing Cover Crops Profitably, 3rd Edition" (Clark, 2007).
2. Legume cover crops for biological nitrogen fixation.
   a. Plant a leguminous cover crop between two primary crops in the rotation. This option does not apply to legumes that are normally part of the crop rotation. The legume shall be seeded at a rate recommended by the NRCS Field Office Technical Guide. Estimate nitrogen credits from the leguminous crop and base any additional N applications according to the guidelines of the Land Grant University, as approved by the NRCS State Agronomist.
   b. Manage legume N to minimize N loss. In climates and soils where rapid N mineralization and/or leaching are likely, plant a legume-grass mixture to increase the biomass C: N ratio. This will decrease the N release rate.
3. Non-leguminous cover crops to capture and recycle residual nitrogen.
   a. Plant a cover crop with a growth rate and rooting depth sufficient to scavenge excess/unused nitrogen remaining in the upper soil profile. Select cover crops, planting dates and seeding rates as determined or agreed to by the NRCS State Agronomist.
   b. Consider reducing the N recommendation for the following crop by an estimated amount based on the site conditions both before and during the cover crop's growing period, the cover crop species, and the termination phase of the cover crop.

   Note: This option does not apply to the same acres on which a leguminous cover crop is applied.
4. Cover crops for weed suppression.
   a. Plant a cover crop with the chemical and physical characteristics necessary to suppress or compete with the identified target weed species. Leave cover crop residues on the soil surface to maximize the allelopathic (chemical) and mulching (physical) effects. Select cover crops, planting dates and seeding rates as determined or agreed to by the NRCS State Agronomist.
5. Biodiversity improvement with cover crops.
   a. Plant cover crop species with the characteristics to attract beneficial insects such as pollinators and/or predator insects, serve as trap crops for damaging insects, and/or provide natural bio-fumigation for soil dwelling pests. Select cover crops, planting dates and seeding rates as determined or agreed to by the NRCS State Agronomist.

Adoption Requirements

This enhancement is considered adopted when two or more of the criteria are met on land use acreage.

Documentation Requirements

1. Crop rotation records, including rotation length in years, crops and cover crops planted,
2. Sequence and description of operations for each crop and cover crop including harvest, tillage, nutrient placement and planting/seeding,
3. Photographs of representative fields showing cover crops added to the rotation, timing and method of cover crop establishment, and extent of cover crop growth just before termination, and
4. Seed and legume inoculant tags and receipts.

References

A. Clark (ed.). 2007. Managing cover crops profitably. 3rd ed. Sustainable Agriculture Network Handbook Series; bk 9.

Magdoff, F. and H. van Es. Cover Crops. 2000. *In* Building soils for better crops. 2nd ed. Sustainable Agriculture Network Handbook Series. National Agriculture Library. Beltsville, MD. pp 87-96.

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Colorado Supplement

to

National CSP 2014 Enhancement Activity Job Sheet: SQL12

Intensive cover cropping in annual crops

Criterion #1 thru #5

Develop the planned crop rotation including cover crops, in a Colorado Conservation Crop Rotation 328 Job Sheet.

Develop planned cover crop applications including seed rates, planting and kill dates and inoculant requirements, in a Colorado Cover Crop 340 Job Sheet.

For dryland cropping systems, planned cover crop termination dates must be consistent with NRCS Cover Crop Termination Guidelines, Version 2, December 2013.

For irrigated cropping systems, the system including cover crops must be compatible with any site-specific consumptive use limitations.

Criterion #2

Develop a nutrient management plan in a Colorado Nutrient Management 590 Job Sheet, which is consistent with Colorado Nutrient Management 590 planning criteria.

Soil tests for mineral systems that do not receive organic nutrients must be less than three years old.

Annual soil and organic nutrient sampling and analysis is required for systems that receive organic nutrient applications such as compost and manure.

Acceptable soil test labs are those that meet the requirements of the North American Proficiency Testing Program – Performance Assessment Program (NAPT-PAP).

Acceptable manure testing labs are those that meet the requirements of the Minnesota Department of Agriculture, Certified Manure Testing Labs Program

Completion of a Colorado Nitrogen Leaching Index Risk Assessment is required for each field and soil test cycle unless the Preliminary Nitrogen Leaching Risk Screening Tool indicates that a risk assessment is not necessary.

Completion of a Colorado Phosphorus Index Risk Assessment is required for each field and soil test cycle when any of the following conditions apply.

- The planned phosphorus (P_2O_5) application rate exceeds CSU fertility recommendation for the planned crop and realistic yield goal, or
- The site is located within a phosphorus- impaired watershed (contributes to 303d-listed water bodies), or
- The Preliminary Phosphorus Risk Screening Tool directs the planner to complete a Phosphorus Index Risk Assessment.

Legume nitrogen credits

For alfalfa, sweet clover and red clover, estimate nitrogen credits based on the Nitrogen Credits for Previous Crops table included in the Colorado Nutrient Management 590 Job Sheet.

For other legumes, follow the procedures outlined in Managing Cover Crops Profitably, 3rd Ed., pages 22 and 23, to estimate nitrogen credits.

or,

Refer to Pacific Northwest Extension Publication 636, November 2012, to estimate plant available nitrogen release from the cover crop.

Additional Documentation Requirements

Provide completed copies of the following to certify practice application, as applicable.

Conservation Crop Rotation 328 Job Sheet

Cover Crop 340 Job Sheets including seed and inoculant tags and receipts

Nutrient Management 590 Job Sheet including copies of current soil and organic nutrient sample analysis