United States Department of Agriculture
Natural Resources Conservation Service

Soil Quality Enhancement Activity - SQL02 – Continuous Cover Crops

Continuous Cover Crops
Growing continuous *seasonal* cover crops of grasses, legumes or forbs following all annual crops during all the non-crop production periods of the rotation. Continuous cover cropping is applicable to conventional, specialty and organic crop production systems.

Land Use Applicability
This enhancement is applicable on cropland.

Benefits
Growing seasonal cover crops during all non-crop periods between annual crops reduces wind and water erosion. Cover crops also restore and maintain soil productivity and soil quality over a wide range of climates and crop species. They do so by increasing organic matter, improving soil fertility, breaking pest cycles and providing habitat for soil macro-fauna, such as earthworms.

Criteria
Implementation of this enhancement requires continuous cover crops during the non-crop production period of the rotation. The cover crops must meet 2 or more of the following criteria:

1. High bio-mass cover crops for erosion control and increased soil organic matter improvement.
    - Plant a cover crop with a growth potential to produce a minimum of 2,000 lbs/acre (dry weight) above ground bio-mass when terminated by harvest, frost, mowing, tillage, crimping, and/or herbicides in preparation for the following crop.
2. Legume cover crops for biological nitrogen fixation.
    - Plant a leguminous cover crop between two primary crops in the rotation, or plant a leguminous crop that replaces one of the primary crops. This enhancement does not apply to legumes that are normally part of the crop rotation. It 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.
3. Non-leguminous cover crops to capture and recycle residual nitrogen.
    - Plant a cover crop with a growth rate and rooting depth sufficient to scavenge excess nitrogen from the root zone of the previous crop. Seed the cover crop at the rate recommended by the NRCS Field Office Technical Guide. Reduce the nitrogen recommendation for the following crop by the amount of nitrogen estimated to have been scavenged and recycled by this cover crop.

This enhancement does not apply to the same acres on which a leguminous cover crop is applied.

4. Cover crops for weed suppression.
    - 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 as recommended in the NRCS Field Office Technical Guide or from the Land Grant University as appropriate.
5. Biodiversity improvement with cover crops.
    - 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 to meet the planned objective as recommended in the NRCS Field Office Technical Guide or from the Land Grant University as appropriate.

Documentation Requirements

- Crop rotation records, including rotation length in years, crops and cover crops planted.
- Sequence and description of operations for each crop and cover crop including harvest, tillage, nutrient placement and planting/seeding

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Reference: 340 – Cover Crop

The cover crops must meet 2 or more of the following criteria:					
	Criteria 1: High Bio-mass (lbs/Ac)	**Criteria 2: Biological N Fixation (lbs/ac)**	**Criteria 3: Capture/Recycle Residual N**	**Criteria 4: Weed Suppression**	**Criteria 5: Biodiversity**
Annual Ryegrass	2000-9000		x	x	
Barley	2000-10000		x	x	
Berseem Clover	6000-10000	75-220		x	
Buckwheat	2000-4000			x	x
Cereal Rye	3000-10000		x	x	
Cowpeas	2500-4500	100-150		x	x
Crimson Clover	3500-5500	70-130		x	x
Hairy Vetch	2300-5000	90-200			x
Medics	1500-4000	50-120		x	
Red Clover	2000-5000	70-150		x	x
Oats	2000-10000		x	x	
Radish	4000-7000	50-200		x	
Sorghum – Sudan	8000-10000		x	x	
Sweetclover	3000-5000	90-170		x	x
Turnips				x	
White Clover	2000-6000	80-200		x	
Winter Wheat	3000-8000		x	x	
Source: *Managing Cover Crops Profitably, 3rd Edition.* Sustainable Agriculture Network. 2007; Minnesota NRCS Cover Crop (340) Practice Standard.					

SEEDING RATES AND ASSOCIATED INFORMATION

Species	Seeding Rate	Seeding Depth (inches)	Seeding Date	Comments
Annual Ryegrass	15 – 20 lbs/ac	¼ to ½	June 1-July 1 OR Aug 15 – Sept 15	Easily established. Good for use as overseeding row crop. May be seeded after harvest.
Barley	1.5 – 2 bu/ac	½ to 1 ½	Aug 15 - Sept 15	May be overseeded into growing crop or seeded after harvest.
Oats	1 – 2 bu/ac	½ to 1 ½	Aug 15 - Sept 15.	Can be seeded on rough plowed land (usually before Sept. 1) and will not need plowing the following spring
Cereal Rye	1 – 1 ¼ bu/ac	½ to 1 ½	Aug 15 - Sept 15	Easily established. Rapid growth in fall and spring. Has an allelopathic property.
Cereal Rye	¼ - ½ bu/ac	½ to 1 ½	Aug 15 - Sept 15	Use this rate only for cropland going into sugarbeets the following spring
Winter Wheat	1- 1 ½ bu/ac	½ to 1 ½	Aug 15 - Sept 15	Advantageous if site is seeded after Sept. 1 or under dry soil conditions.
Buckwheat	35 – 60 lbs/ac	½ to 1 ½	June 1 - July 10	Summer smother crop. Residue degrades rapidly.
Sorghum – Sudan	25 – 30 lbs/ac	½ to 1	May 15 - July 1	Advantageous to use on well drained and droughty sites.
Turnips	1- 4 lbs/ac		July 15 - Aug 15	Fast growing and tolerate cold temperatures. Broadcast or drilled.
Oilseed Radish	8 – 12 lbs/ac	¼ to ½	June 1 - Sept 15	Drilled or broadcast & incorporated. Best suited: early fall growth after small grain, vegetable, corn silage, early soybean harvest.
Barley	0.75 bu/ac	½ to 1 ½	April 1 - May 15	Broadcast or drilled; kill by using chemicals, row cultivation or both

Spring Wheat	0.75 bu/ac	½ to 1 ½	April 1 - May 15	Broadcast or drilled; kill by using chemicals, row cultivation or both
Oats	1 bu/ac	½ to 1 ½	April 1 - May 15	Broadcast or drilled; kill by using chemicals, row cultivation or both
Berseem Clover	10 – 15 lbs/ac	¼ to ½	Early spring into small grain.	Summer annual. Often mixed with ryegrass or small grains. Heavy N producer, establishes well with an oat nurse crop – excellent cover for sg-c-sb rotations. Winter kills.
Cowpeas	30 – 90 lbs/Ac	1 to 2	May 15 - July 1	Summer annual adapted to southern MN. Often mixed with sorghum-sudangrass or interseeded with corn.
Crimson Clover	10 – 15 lbs/ac	¼ to ½	Early spring into small grain OR Aug 1 - Sept 15	Adapted to southern MN; rapid summer or fall growth; use as a winter killed annual like oats. Provides good groundcover and weed control.
Hairy Vetch	20 – 30 lbs/ac	½ to 1 ½	Aug 1 - Sept 15	Adapted to southern MN; produces plenty of residues to condition soil and supply N. It can provide sufficient N for many vegetable and late planted crops and partially replace N for corn. Smothers spring weeds. Commonly planted with winter cereals.
Medics	10 – 20 lbs/ac	¼ to ½	Aug 1 - Sept 15	Adapted to MN; ideal for long rotations of forages and cash crops. Often used after wheat harvest. May become invasive if allowed to seed out. Hard seed will remain viable in soil for many years.
Medium Red Clover	8 – 10 lbs/ac	¼ to ½	April 15 - June 15 OR Aug 1 - Sept 15	Good on somewhat poorly drained sites and potato fields with moderate pH. Prefers drilling to broadcast.
Sweet Clover	8 – 10 lbs/ac	¼ to ½	Early spring into small grain OR Aug 1 - Sept 15	Advantageous to use on well drained and droughty sites. Prefers drilling to broadcast. May become invasive if allowed to seed out. Hard seed will remain viable in soil for many years.
White Clover	5 – 7 lbs/ac	¼ to ½	Aug 1 - Sept 15	Often mixed with annual rye or red clover. Good when planted between rows of irrigated vegetables or trees.