

Energy Enhancement Activity – ENR12 – Use of legume cover crops as a nitrogen source



Enhancement Description

This enhancement is for the use of legume cover crops as a primary source of nitrogen in a cropping system. Use of legume cover crops is applicable to conventional, specialty and organic crop production systems.

Land Use Applicability

Cropland

Benefits

Approximately 35,000 cu ft of natural gas is required to produce one ton of nitrogen fertilizer; or on average, 20,000 BTU’s are required to produce one pound of synthetic nitrogen; or approximately 140 BTU’s are required to produce one gallon of diesel fuel. Legume

cover crops can provide 50 to 100 lbs of plant available nitrogen per acre to reduce synthetic nitrogen use and fossil fuel use.

Conditions Where Enhancement Applies

This enhancement applies to all crop land use acres.

Criteria

1. On all acreage where this enhancement will be applied, plant and manage legume cover crops prior to all field or specialty crops raised that require the use of commercial nitrogen.
2. Estimate nitrogen credits from the leguminous crop.
3. The legume cover crop must be selected and managed to supply a **minimum of 40 lbs N/acre credit** for the following crop.
4. Nitrogen credit estimate should consider:
 - a. The amount of biomass produced (plant height and maturity)
 - b. The nutrient composition of the cover crop (for example, clover vs. vetch)
 - c. The decomposition rate of the cover crop during the cash crop growing season based on incorporation of the residue or being left on the soil surface after planting. Note: An example procedure is outlined in “*Managing Cover Crops Profitably, 3rd Edition*” (Sarrantonio, 1998)
5. Seeding rates for the selected cover crop species shall be based on NRCS practice standards or the respective state Land Grant Universities recommendation.
6. Base additional nitrogen application rates for crops following the cover crop on guidelines from the state Land Grant University. Reduce nitrogen application rates by at least the amount credited in #3 above to account for the nitrogen available from the legume cover crop.



United States Department of Agriculture
Natural Resources Conservation Service

2013 Ranking Period 1

Adoption Requirements

This enhancement is considered adopted when the land use acreage has been planted to a leguminous cover crop that meets or exceeds the minimum nitrogen credit from the criteria above.

Documentation Requirements

Written documentation for each year of this enhancement describing the following items is required:

1. A map showing where the enhancement is applied
2. Type of legume cover crop planted
3. Calculations for estimating available nitrogen
4. Application rates of additional nitrogen by field
5. Realistic yield goals for field or specialty crop grown

References

Clark, A.(editor.). 2007. Managing cover crops profitably. 3rd ed. Sustainable Agriculture Network Handbook Series.

Magdoff, F. and H. van Es. Cover Crops. 2000. *In* Building soils for better crops. 2nd ed. Sustainable Agriculture Network Handbook Series. pp87-96. National Agriculture Library. Beltsville, MD.

Liebman, M., Graef, R., Nettleton, D., Cambardella, C.A. 2011. Use of legume manures as nitrogen sources for corn production. Renewable Agriculture and Food Systems. p. 1-12. Available:
<http://dx.doi.org/10.1017/S1742170511000299>

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Reference:

- **340 – Cover Crop**
- **590 – Nutrient Management**
- [Midwest Cover Crops Council Decision Tool](#)
- [Managing Cover Crops Profitably, 3rd Edition](#)

Species	Seeding Rate	Seeding Depth (inches)	Seeding Date	Comments
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 southeastern 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.
Medium Red Clover	8 – 10 lbs/ac	¼ to ½	April 15 - June 15 OR	Good on somewhat poorly drained sites and potato fields with

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			Aug 1 - Sept 15	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.

Please Note:

- Care is advised when determining the amount of N that will be available to the crop following the legume cover crop. As a general rule, full season clovers can supply up to 75 lbs. N/acre to the succeeding crop (more for unharvested sweet clover). But per acre yield in Minnesota will not be substantial if legumes are seeded in late summer-early fall and destroyed the following spring. The procedure to determine the amount N available is described in more detail in the referenced [“Managing Cover Crops Profitably” book](#) (pages 22-23). Chart 2, (page 67) in this book shows ranges of per acre dry matter for respective grasses and legumes.
- Nutrient application rates shall be consistent with University of Minnesota or contiguous land grant university recommendations.
 - [University of Minnesota Fertilizer Recommendations for Agronomic Crops in Minnesota](#)
 - [University of Minnesota—Nutrient Management of Commercial Fruit and Vegetable Crops in Minnesota](#)
 - [University of Minnesota Commodity Crop Production Website](#)
 - [Iowa State University—A General Guide for Crop Nutrient and Limestone Recommendations in Iowa](#)
 - [South Dakota State University—Fertilizer Recommendations \(EC750 Sept. 2005\)](#)
 - [North Dakota State University—North Dakota Fertilizer Recommendation Tables and Equations \(SF-882\)](#)
 - [University of Wisconsin—Nutrient Application Guidelines for Field, Vegetable, and Fruit Crops in Wisconsin \(A2809\)](#)

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