United States Department of Agriculture
Natural Resources Conservation Service

2014 Ranking Period 1

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

Crop

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.

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

ENR012 – Use of Legume Cover Crop as a Nitrogen Source

Documentation requirements

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

1. Record the establishment date.
2. Record the seeding method.

General guidance and references:

1. Seedbed preparation, seeding mixes, seeding rates, dates, depths, fertility requirements, site adaptation and planting methods will be consistent with the requirements and/or Tables in the IN NRCS Seeding Tool in the INFOTG and /or the Midwest Cover Crop Council Cover Crop Decision Tool. Choose plant species (Cover Crops) from the following lists:
    - the species, or mix with ≥ 50%, rated 4 for Nitrogen Source attribute from the Midwest Cover Crop Council Decision Tool at: http://mccc.msu.edu/selectorINTRO.html and
    - the **IN Seed Calculator** (http://efotg.sc.egov.usda.gov/references/public/IN/IN_NRCS_Seeding_Calculator.xlsm)
2. Inoculate the seed with the specific Rhizobium bacteria for the selected legume at the time of planting. Use only fresh inoculant (check the expiration date).
3. Earliest possible establishment and delayed termination of the legume cover crop will allow more opportunity for growth and increased potential for nitrogen credit.
4. SARE- *Managing Cover Crops Profitably*- http://www.sare.org/publications/covercrops.htm

   Chart 2 Performance and Roles, page 67.
   (*Managing Cover Crops Profitably*, 3rd Edition, SARE)

Species	Legume N Source	Total N (lb/A)*
Berseem clover	Yes	75 – 220
Cowpeas	Yes	100 – 150
Crimson clover	Yes	70 – 130
Field/Winter peas	Yes	90 – 150
Hairy vetch	Yes	90 – 200
Medics	Yes	50 – 120
Red clover	Yes	70 – 150
Subterranean clovers	Yes	75 – 200
Sweetclovers	Yes	90 – 170
White clover	Yes	80 – 200
Woollypod vetch	Yes	100 – 250

Brassicas	No (N scavenger)	0
Non-Legumes (grasses)	No (N scavenger)	0

Caution – the Total N (lb/A) should be used as a guide. Values are based on growth at or near full fixing potential (early bloom stage). Utilizing testing procedures such as the Pre-Sidedress Soil Nitrate Test (PSNT) and/or with Test Strip Trials can assist in more accurately predicting the Total N available.

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