

Water Quality Enhancement Activity – WQL16 – 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 natural gas is required to produce one ton of nitrogen fertilizer. Legume cover crops can provide 50 to 100 lbs of plant available nitrogen per acre to reduce off-farm energy requirements.

Criteria

1. 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. The legume cover crop must be selected and managed to supply a significant amount of N for the following crop. 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)
3. NRCS State Offices should work with their state Land Grant Universities to establish the minimum N credit that will be required from legume cover crops.
4. Base additional nitrogen application rates for crops following the cover crop on guidelines of 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.

Documentation Requirements

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

1. A map showing where the enhancement is applied
2. Type of legume cover crop planted



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3. Calculations for estimating available nitrogen
4. Application rates of additional nitrogen by field
5. Realistic yield goals for field or specialty crop grown

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As a Nitrogen Source**

Minimum Nitrogen (N) credits for crops grown the year prior to planting N responsive field crops.

Previous crop	N credit lb N /a
Alfalfa, established ¹	40 + (% stand)
Alfalfa, seeding ²	40 + 0.5 (% stand)
Clover, established ¹	40 + 0.5 (% stand)
Clover, seeding ²	20 + 0.5 (% stand)
Trefoil, established ¹	40 + 0.5 (% stand)
Barley + legume	30 + 0.5 (% stand)
Oats + legume	30 + 0.5 (% stand)
Wheat + legume	30 + 0.5 (% stand)
Clover-grass hay	40
Grass hay	40
Dry edible beans	20
Soybeans	30
CRP land ³	40

¹ Established more than one year.
² Six to ~12 months after seeding
³ Whether grass/legume or just grass.

From Michigan State University (MSU) Extension, Bulletin E2904, Nutrient Recommendations for Field Crops in Michigan.

Minimum Nitrogen (N) credits for crops grown the year prior to N responsive vegetable crops.

Previous crop	N credit (lb N /A)
Alfalfa, established	40 + (% stand)
Alfalfa, seeding	40 + 0.5 (% stand)
Clover, established	40 + 0.5 (% stand)
Clover, seeding	20 + 0.5 (% stand)
Trefoil, established	40 + 0.5 (% stand)
Barley + legume	30 + 0.5 (% stand)
Oats + legume	30 + 0.5 (% stand)
Wheat + legume	30 + 0.5 (% stand)
Dry edible beans	20
Soybeans	30

(From MSU Extension Bulletin E2934 Nutrient Recommendations for Vegetable Crops in Michigan.)

Cover Crop Species Planted in Corn N Nitrogen Credit by cover crop and planting date

Planting date:	June 1-July 1*	August 1-Sept 10**
Cover Crop Species	N/lbs/ac	
Annual medic	100	40
Berseem clover	90	60
Crimson clover	60	50
Mammoth Red clover	70	60
Medium red clover	70	60
Sweetclover	90	70
White Clover	100	60
60/40 (RC/SW) mix	90	60
Hairy Vetch	180	60

*Seeding Method: Overtop of corn in v4-v8 stage

** Aerial or high boy seeded overtop of corn

Cover Crop Species Planted in Soys N Nitrogen Credit by cover crop and planting date

Planting date:	August 25-Sept. 15*
Cover crop species	N/lbs/ac
Crimson clover	50
Mammoth Red clover	60
Medium red clover	60
Sweetclover	70
White clover	60
60/40 (RC/SW) mix	60
Hairy Vetch	60

* Aerial or high boy seeded overtop of soybeans

(Source: MSUE Bulletin 2646 Michigan Field Crop Ecology)

Using Nitrogen credits in Manure Management Planner (MMP)

Custom nitrogen recommendations may be entered on the Crops panel of MMP. For an individual field, you may enter a reduced nitrogen nutrient recommendation in one of 2 ways:

1. Scroll to the right on the field line in the Crops panel to the column labeled Planned Cover Crop (not harvested). Select from the drop down list a legume choice. Enter percent legume stand in column labeled legume % stand. Use the actual percentage of the legume component when a legume-mix cover crop is used. The default N recommendation will adjust.

OR

2. Enter a custom N recommendation in the column labeled Custom N rec for each field individually. The rate you enter will be the default rate given minus the N credit as determined from the above tables. MMP will over-ride the default N recommendation with the custom recommendation.