Water Quality Enhancement Activity– WQL10 – Plant a cover crop that will scavenge residual nitrogen

Enhancement Description
Plant a cover crop that will scavenge nitrogen left in the soil after the harvest of a previous crop. Suitable cover crops include those with at least a "Very Good" rating for scavenging nitrogen as documented in "***Managing Cover Crops Profitably, 3rd Edition***" (Sarrantonio, 1998**),** Chart 2 Performance & Roles, pg 67**.** Examples include cereal rye, barley, forage radish and sorghum sudan.

Land Use Applicability
Cropland.

Benefits
Planting an annual cover crop to scavenge residual nutrients from cropland after the harvest of a previous crop effectively utilizes residual nutrient resources to supply following crops with nutrients required to efficiently produce food, forage, fiber, and cover while minimizing environmental degradation.

Criteria
Implementation of this enhancement requires:

1. The cover crop selected shall have the growth rate and rooting depth required to scavenge excess nitrogen from the root zone of the previous crop. Suitable cover crops include those with at least a "Very Good" rating for scavenging nitrogen as documented in ***Managing Cover Crops Profitably, 3rd Edition, Chart 2 Performance & Roles, pg 67.*** Examples include cereal rye, barley, forage radish and sorghum sudan.
2. Timing of planting and seeding rates for cover crops shall follow the recommendations in the respective NRCS Field Office Technical Guide (FOTG).
3. The producer must have a current soil test (no more than 3 years old).
4. Nitrogen application rates for the crop following the cover crop must be reduced by at least 15% from the "Land Grant University (LGU) recommendations to account for the recycling of N by the cover crop.
5. The producer shall not increase soil surface disturbance over existing benchmark conditions.

Documentation Requirements

Documentation for each Treatment area (field) and year of this enhancement describing these items:

1. A map showing where the activities are applied
2. Cover crop species planted
3. Cover crop planting date
4. Cover crop seeding rate (bu/ac)
5. Annual crop planted
6. Nitrogen application rates/amounts for the annual crop
7. Treatment acres

United States Department of Agriculture
Natural Resources Conservation Service

IDAHO ADDENDUM 2011
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Additional guidance for scavenger crops:

When crops in the rotation inefficiently use nitrogen, or in areas with nitrate ground water problems, non-legume species can recycle existing soil nitrogen and can reduce the risk of excess nitrate leaching into ground water. Fall cover cropping is an effective means to capture nitrogen that would normally leach deep into the soil profile. Table 1 lists non legume cover crops, their life cycle and suggested seeding rates. The effectiveness of this practice hinges on a few key factors:

- Seed the cover crop as soon as possible after the preceding crop for optimum growth -cereal rye, triticale and turnips are among the most tolerant and fast growing in the cool fall temperatures.
- Incorporation of the cover crop should be delayed until spring.

Table 1. Non Legume cover crop species with associated agronomic data.

Species	Life Cycle	% Nitrogen Content[1]	Seeding Rate (lbs/A)	Seeding Depth (inches)
Forage turnips	SA	3.3	3-5	1/4 to1/2
Forage radish	SA		10-15	1/4 to1/2
Oilseed radish	SA	3.8 tops 2.5 roots	25	1/4 to1/2
Mustards (White)	SA	3.5	15	1/4 to1/2
Mustards (Oriental)	SA	3.5	10	1/4 to1/2
Canola / Rape	SA/WA	3.5	15	1/4 to1/2
Annual ryegrass	SA	1.3	15-25	1/4 to1/2
Barley	SA / WA	2.2	50-100	1 to 2
Rye	SA / WA	2.8	50-100	1 to 2
Triticale	SA / WA	2.0	50-100	1 to 2
Wheat	SA / WA	2.3	50-100	1 to 2
Oats	SA	2.1	35-70	1 to 2
Sudangrass	SA	1.3	20-60	1 to 2

1 Data from USDA Plant data base and UC SAREP online Cover crop database (http://www.sarep.ucdavis.edu/ccrop/)
Notes:
Life cycles: P = perennial, WA = winter annual, SA = summer annual, B = biennial
Nitrogen values vary depending on cover crop densities (biomass produced) and date of planting
Use any of the non-legume cover crop species to scavenge nitrogen left in the soil, refer to CSP enhancement WQL10.

Estimating the Amount of Nitrogen (N) Scavenged by the Cover Crop

To do this, assess the total yield of the cover crop and the percentage of nitrogen in the plants just before they die. To estimate yield, take cuttings from several areas in the field, dry and weigh them. Using a yardstick or metal frame of known dimensions (1 ft x 2 ft which equals 2 ft^2 works well), clip the plants at ground level within the known area. Dry them out in the sun for a few consecutive days, or use an oven at about 140 degrees F for 24 to 48 hours until they are "crunchy dry". Use the following equation to determine per-acre yield of dry matter:

$$\textbf{Yield (lbs) / acre} = \frac{\textbf{total weight for dried samples (lbs)}}{\textbf{\# square feet you sampled}} \times \frac{\textbf{43,560 sq ft}}{\textbf{1 Acre}}$$

While actual sampling is more accurate, you can estimate your yield from the height of your green manure crop and its percentage of groundcover. For most small grains and other annual grasses, start with 2,000 lbs/acre at 6 inches and 100 percent groundcover. Add 300 lbs for each additional inch and multiple by percentage of ground cover. A wheat crop that is 18 inches tall and 100 % groundcover will weigh roughly:

Start with 6 inches = 2,000 lbs/acre
Additional 12 inches = 300 lbs/inch x 12 = 3,600 lbs/acre
Total = 5,600 lbs/acre

If the stand is less than 100% groundcover, multiply by the % of groundcover. Keep in mind that these are rough estimates to give you a quick guide for the productivity of your green manure. To know the exact % N in your plant tissue, you would have to send it to a lab for analysis. Testing is always a good idea, as it can help you refine your estimates of N in the green manure crop and how much N was scavenged. Soil testing in the spring and fall provides trend data for residual nitrogen.

The following rules of thumb may help:

- Most cover crop grasses contain 2 to 3 percent N before flowering and 1.5 to 2.5% after flowering.
- Cover crops such as brassicas will generally be similar to, or slightly below grasses in their N content.

$$\textbf{Total N in cover crop (lbs /A)} = \textbf{yield lbs/A} \times \frac{\textbf{\%N}}{\textbf{100}}$$

To estimate what will be available to your subsequent crop, divide this quantity of N by:

- 2, if the green manure will be conventionally tilled
- 4, if it will be left on the surface in a no-till system

Example: Wheat cover crop 18 inches tall, 100% cover, conventionally tilled into the soil.

6 inches = 2,000 lbs/acre
12 inches = 300 lbs /inch x 12 = 3,600 lbs
Total = 5,600 lbs

5,600 lbs /A x 0.03 N = 168 lbs N content (scavenged)

N available to subsequent crop with cover crop tilled in:
168 lbs N / 2 = 84 lbs N available

This activity may NOT be used with the following enhancements:
ANM01, ANM12, ANM21, ANM22, SOE02, SQL03, SQL06

Potential duplicate enhancements:
340 – Cover crop, 328 – Conservation crop rotation