Water Quality Enhancement Activity – WQL24 – Apply enhanced efficiency fertilizer products

Enhancement Description
At least 50% of the pre-emergent and early post emergent nitrogen fertilizer and/or phosphorus fertilizers used for crop production must include enhanced efficiency formulations.

Land Use Applicability
Cropland, Pastureland

Benefits
Nutrient management encompasses managing the amount, source, placement, and timing of the application of plant nutrients and soil amendments. Nutrient management effectively utilizes available nutrient resources to supply crops with nutrients required to efficiently produce food, forage, fiber, and cover while minimizing environmental degradation.

The use of enhanced efficiency fertilizer products can make nitrogen or phosphorus available to plants over a longer portion of the growing season to match the plant uptake needs. This limits the loss of nitrogen to leaching and denitrification, and can help control soil emissions of the greenhouse gas nitrous oxide. Increased phosphorus availability improves phosphorus use efficiency and reduces the potential for loss by leaching (soluble P) and erosion (P bound to detached soil particles).

Conditions Where Enhancement Applies
This enhancement applies to all crop or pasture land use acres.

Criteria
Implementation of this enhancement requires:

1. Enhanced efficiency fertilizers, used in the State must be defined by the Association of American Plant Food Control Officials (AAPFCO) and be accepted for use by the State fertilizer control official, or similar authority, with responsibility for verification of product guarantees, ingredients (by AAPFCO definition) and label claims.
2. The use of one or more nitrogen or phosphorus fertilizer products defined as enhanced efficiency fertilizers that are recommended by the state Land Grant University (LGU) and concurred with by NRCS on all treatment acres to supply at least 50% of the LGU recommended nitrogen or phosphorus requirement for the crop(s) grown.
3. Application of nutrients within the LGU recommendations based on soil testing and established yield goals and considering all nutrient sources.

4. Minimize soil surface disturbance during fertilizer placement.

Adoption Requirements
This enhancement is considered adopted when the enhanced efficiency product, for nitrogen or phosphorus enhancement, has been utilized as a fertilizer or fertilizer additive and applied to the land use acre.

Documentation Requirements
1. A map showing where the activities are applied,
2. Enhanced efficiency product used,
3. Treatment acres,
4. Soil test results,
5. Crops grown and yields (both yield goals and measured yield),
6. Calibration of fertilizer application equipment, and
7. Nutrient application rates/amounts and application dates for each treatment area.

Note: In lieu of documenting each individual item listed in the Documentation Requirements, a Certified Crop Advisor plan that contains each of the items may be substituted.

References
AAPFCO. 2011. Association of American Plant Food Control Officials, Official Publication No. 64. AAPFCO Inc., Little Rock,Arkansas.

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Controlled- and Slow-Release Nitrogen Fertilizers	
Slow-Release	**Controlled-Release**
Urea-formaldehyde or methylene urea formulations	Polymer-coated urea (PCU)
Sulfur-coated urea	
IBDU (isobutylidene diurea)	

Note: Ability of enhanced efficiency fertilizers to minimize N loss and increase net income varies by product, crop, area of the state, site, climatic conditions and application timing.

1. Polymer coated urea (In this case ESN) is being evaluated by the University of Minnesota and shows some promise in the following settings:
   - PCU on corn ground for spring pre-plant applications in South-Eastern Minnesota.
   - PCU on corn ground for late fall or spring pre-plant applications in South-Central, South-Western and West-Central Minnesota.
   - PCU on coarse textured soils.
   - PCU with irrigated potatoes.

2. Urea-formaldehyde or methylene urea formulations were developed primarily for horticultural or turf production purposes and are expensive. Caution is advised when considering such products for field crops. The product should be registered for agricultural use in Minnesota; provide a proven crop yield response similar to traditional sources of N; and be somewhat competitively priced. **Additionally, use of these types of formulations for small late season foliar applications to field crops does not meet the intent of this enhancement.**

3. Early Minnesota research on sulfur coated urea indicated some inconsistency in efficacy of this product. It also can be expensive.

4. Application timing of enhanced efficiency nitrogen fertilizers.

   - Use of slow release N applies mainly to spring pre-plant N applications. Caution is advised for in-season applications. The in-season application must be early enough so that sufficient N is released during a crop's rapid growth period. An application soon after plant emergence may be o.k. A late sidedress application of slow or controlled release N is not advisable.
   - **Use of slow or controlled release N in fall to replace current pre-plant or in-season N applications does not meet the intent of this enhancement.**
   - Individuals who currently fall apply other N forms are better served considering spring pre-plant or side-dress applications instead of a fall application of a slow or controlled release product.

5. Nitrification inhibitors, urease inhibitors, or products containing nitrification or urease inhibitors are not considered slow or controlled release products for purposes of this enhancement. Enhancement AIR08 addresses nitrification and urease inhibitors.

6. Total nutrient application rates shall be consistent with University of Minnesota or contiguous land grant university recommendations.
   http://www.extension.umn.edu/CommodityCrops/
   http://www.extension.umn.edu/distribution/cropsystems/DC5886.html