NRCS	**Michigan Technical Note** **USDA-Natural Resources Conservation Service**

AGRONOMY #37
Subject: Using the Michigan NRCS MARI Excel Spreadsheet for Nitrogen Leaching Index Inventory and Evaluation
Date: November 2008 (revision 1)

GENERAL INFORMATION

A simple procedure for identifying high Nitrogen (N) leaching soils is to use the N Leaching Index (LI) in the Michigan NRCS FOTG, Section II, Water Quality and Quantity. This process involves completing an inventory of all the soil series, then assigning a hydrologic group (A, B, C, or D) to the soil using the list of soil series found in the NRCS Engineering Field Manual, in the on-line NRCS Soils Data Mart, or in the county soil survey engineering table. Note that some soils have a dual hydrologic group rating, based on the drained or undrained condition. For example, the soil series Parkhill has a B/D hydrologic group rating. The field is a B hydrologic group when it has a subsurface drainage system.

One way to complete the soil N leaching evaluation is to consult the LI maps in Section II of FOTG by soil hydrologic group to determine which soils have a high, medium, or low risk of N loss below the root zone based on the map location. Once the high risk soils are noted, the soil survey map is consulted to determine which fields have a high risk for N leaching. The process for Inventory & Evaluation for nitrogen leaching as a resource concern is fairly tedious and time consuming.

An easier way to evaluate soils for potential N leaching loss below the root zone is to use the NRCS Michigan Manure Application Risk Index (MARI) spreadsheet as an Inventory and Evaluation tool to complete the N leaching Index by soil series. The latest MARI Excel spreadsheet is in the NRCS MI FOTG Section IV, G. Technical Tools, under Field Assessment Tools.

Use the following procedure:

1. Inventory the soil series and drainage on each field. Note which fields have subsurface (tile) drainage.

2. Enter each soil series in the MARI Spreadsheet.

3. Answer “y” or “n” to the tile drained section of the spreadsheet.

4. Look up the Hydrologic Map A, C or D and assign the N leaching risk (l-low; m-medium; h-high).

5. Identify which fields have a high N leaching loss potential using three tools:

   - County soil survey map for that location.
   - The Michigan Nitrogen Leaching maps by soil hydrologic group (A, B, C, or D).
   - Field location by township and section.

If any field has a medium ranking, a nutrient management plan (NMP) is required. If any field has a high ranking, then a NMP plus some of the following practices are required to reduce N loss below the root zone:

1. Develop a nitrogen budget that identifies all N sources (manure, commercial fertilizer, legumes, starter N, atmospheric N, N in irrigation water, etc.)

2. Split-apply the nitrogen using ammoniated forms of N inorganic fertilizers.

3. Use a slow release form of nitrogen*.

4. Follow MSUE N recommendations for realistic crop yield goals.

5. Sow a rye or oilseed radish cover crop after harvest ahead of or during fall manure application.

6. Do not exceed the N rates recommended for crops that follow manure applications.

7. Use the NRCS MI Plant Available Nitrogen (PAN) calculator to estimate the amount of N available from the manure application form, rate, placement, and timing of manure incorporation or if it is surface applied. Refer to Agronomy Technical Note #20, 'Plant Available N Calculator' and attached Excel spreadsheet.

8. Fertigation and Irrigation Scheduling to 'spoon feed' nitrogen all season.

9. Pre-sidedress N testing (PSNT) for corn and sugar beets.

10. Corn stalk Nitrate testing.

11. Tissue testing for N sufficiency where the N rate of application is voluntarily reduced.

Also, refer to the current version of NRCS MI, e FOTG, Section IV, Nutrient Management (590) practice standard.

The selected N Management Strategies are described in a narrative at the bottom of the 590 conservation sheet for fields with high N leaching potential or in a short description by field or crop in the Nutrient Management Plan.

Attached is a sample MARI spreadsheet Inventory & Evaluation for a farm located in southwest Michigan based on the soils inventory. Note the Oshtemo soil has a medium LI ranking, and Coloma, Spinks and Granby (drained) soils have a high LI ranking. Therefore, the NMP needs to explain a strategy to keep N from leaching below the root zone.

**See MI Agronomy Tech Note 31 found in the NRCS MI eFOTG Section 1, General References, Reference Material, Technical Notes – Agronomy.*

MICHIGAN MANURE APPLICATION RISK INDEX WORKSHEET

Fill in shaded areas only!

Farm Name:	SW Michigan Farm N leaching Evaluation				
Tract Numbers:					
Township:					
Section:					
Field No:					
Acres:					

FIELD FEATURES "INPUT"

I. SOIL MAP UNIT

				Drained?	**Drained?**
If drained, enter Y				y	n
Insert Soil Series	coloma	spinks	oshtemo	granby	granby
1. Soil Hydrologic Group	**A**	**A**	**B**	**A**	**D**
2. Soil Management Group	**4a**	**4a**	**4a**	**5c**	**5c**
3. Percent Slope					

II. WATER QUALITY

4. Soil Test Phosphorus Value					
5. Conc. Water/Surface Inlet					
6. Nitrogen leaching Index	**h**	**h**	**m**	**h**	**l**
prompt for cell above	**Map**	**Map**	**m**	**Map**	**Map**