

## **Enhancement and Updating of the MSUFR and MSUNM Computer Programs**

**Project Number:** GR01-011

**Team Leader:** Darryl D. Warncke

**Team Members:** Lee W. Jacobs and Al Go

### **STATEMENT OF CHALLENGE**

Sound nutrient management is based on knowledge of the fertility status of soils within crop production fields of a farm. Records documenting the nutrient status of field soils and the amounts of nutrients added are requisite to meeting the requirements of nutrient management plans. The program (MSUFR) used by the MSU Soil and Plant Nutrient (SPN) Laboratory to provide nutrient recommendations to farm and homeowner clientele was in need of updating from a DOS based program to an interactive Windows based program. The MSU Nutrient Management (MSUNM) record keeping system that utilizes MSUFR needed simultaneous upgrading to make it more user friendly. In 1995 nutrient recommendations for corn, soybean, wheat and alfalfa were adopted for the Tri-states of Michigan, Ohio, and Indiana (MSU E-2567). Putting the recommendations for the other field and vegetable crops into the same format was needed to pave the way for more uniform recommendations across these three states.

### **OBJECTIVES**

The overall goal of this project is to update and enhance the MSU Fertilizer Recommendation (MSUFR) and MSU Nutrient Management (MSUNM) software programs. Improvements in these programs will:

- a) increase the ability of the MSU Soil and Plant Nutrient Lab (SPNL) to support the extension service and meet the needs of stakeholders in Michigan,
- b) increase the functionality and attractiveness of MSUNM for managing nutrients on farms and encourage producers to follow recommended GAMMPS, and
- c) increase the efficiency of county extension agents and agricultural consultants to assist their farm clientele in developing and following environmentally and economically sound nutrient management programs.

Specific objectives to be addressed to meet the overall goals:

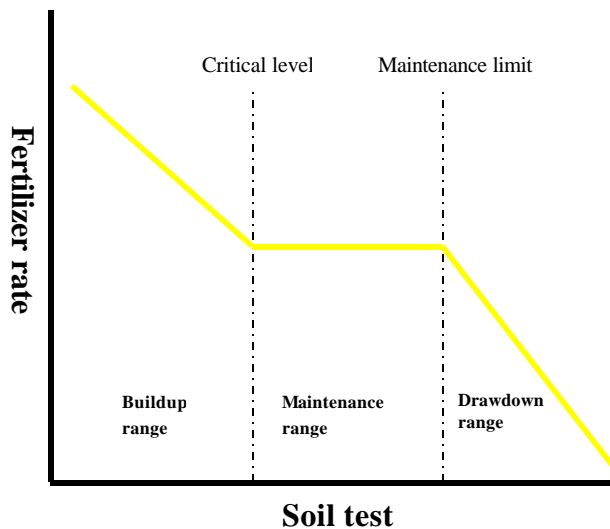
1. Develop a completely new MSUFR program as an interactive Windows program.
2. Incorporate into the MSUFR program the platform for electronic transfer of soil test data and nutrient recommendations from the MSU Soil and Plant Nutrient (SPN) Lab to County Extension offices, consultants or farm operations and other stakeholders.
3. Improve and enhance the nutrient management and pesticide application

- record keeping capabilities of the MSUNM program.
4. Develop technical support options to assist in data transfer between the SPNL and producers submitting samples, especially users of MSUNM.

## **RESULTS AND ACCOMPLISHMENTS**

The MSU Fertilizer Recommendation (MSUFR) program is used by the MSU Soil and Plant Nutrient (SPN) Lab and by County Extension Agriculture agents for preparing lime and fertilizer (nutrient) recommendations based on soil test information generated in the SPN lab or commercial soil test labs. MSUNM (MSU Nutrient Management) is a software package for managing input resources, such as fertilizers, manure, and pesticides. It utilizes the information generated in MSUFR for managing nutrient inputs.

In preparation for the rewriting of MSUFR the nutrient and lime recommendations for all field crops and vegetable crops have been revised into the “Tri-State” format currently used for corn, soybean, wheat and alfalfa (E-2567). This will facilitate development of common recommendations for field and vegetable crops grown in Michigan, Indiana and Ohio. This approach is illustrated in figure 1. Recommendations presented in this format distinguish clearly the amounts of phosphorus and potassium required to build up the soil to the level essential for producing the most economical yield, and the amounts removed from the field (soil) in the harvested portion of the crop that can be applied to maintain soil nutrient levels. When the soil test value is below a critical soil test level the nutrient recommendation is a combination of an amount to build up the soil to the critical level and a maintenance amount to replace that removed in the harvested portion of the crop. When the soil test value is slightly above the critical level a maintenance amount only is recommended. Above the upper maintenance level the recommendation drops rather quickly to zero.



*Figure 1. Recommendation approach for phosphorus and potassium used in MSUFR2.*

Crop nutrient removal and application of maintenance amounts of phosphorus is of particular importance for the development of comprehensive nutrient management plans

(CNMP). Recommendations for lawns and gardens, small fruits, tree fruits and other specialty crops were revised to be more environmental sensitive, but not in the “Tri-State” format. We have worked with Automated Technologies, Inc. of State College, PA to facilitate the programming of MSUFR2 based on the information we provided. A program was developed that enables the preparation of soil test reports containing test results and nutrient recommendations and the electronic transfer of this information to county extension offices and/or stakeholders. The main program written for use in the MSU SPN Lab resides on the designated server purchased from these grant funds for this use. An companion executable version of MSUFR2 has been prepared for use by county extension offices and agents to receive the soil test information electronically from the SPN Lab or from other soil testing labs. Use of the new MSUFR2 program was put in place on July 1, 2003. Changes and additions will be made as necessary to meet needs. The complete network will continue to be developed.

To support the new recommendations program a series of “Nutrient Management Information Sheets” have been and are in the process of being prepared. Nutrient recommendations and management bulletins, one for field crops and one for vegetable crops, are in the process of being prepared and should be available during the Fall of 2003. These will replace bulletins E-550 A and E-550B. Training sessions on the use of MSUFR2 are planned to familiarize users with it.

MSUNM is a management tool to assist crop and livestock producers with fertilizer and manure nutrient management and pesticide application record keeping. 50-60 farmers, primarily livestock producers, in Michigan, have used the early Windows version of this computer program released in February 2001. Five upgrades have been released since then to correct “bugs” and to add enhancements to the original release. Additional farmer operations have began using it. Included within the Windows version of MSUNM is the capability to transfer soil fertility test data from the MSU SPN Lab directly into MSUNM via an electronic file. MSUNM has been enhanced to include the ability to transfer soil fertility test data and manure analysis results from several commercial analytical laboratories – A&L Great Lakes Lab, Brookside Lab and Land O’Lakes Lab. This is possible with a protocol developed by Al Go and Dr. Jacobs that facilitates the electronic transfer or exchange of soil test data and associated information between commercial or university soil test laboratories and extension offices, clientele or consultants. Possible partnerships with SST Development Group, Inc and Farm Works, Inc are being explored to increase the utilization and distribution of MSUNM. Farm operations that are using MSUNM have found it to be a valuable aid for managing their inputs, nutrients and pesticides because this program is designed to be a complete record keeping system. As such it is a valuable tool to assist farmers in keeping necessary records for state and federal programs.

### **Outreach Publications**

Warncke, D. 2003. The new phosphorus and potassium recommendations. Nutrient Management Information Series No. 1. Dept. Crop and Soil Sciences, Michigan State University

Warncke, D. and J. Dahl. 2003. Nutrient recommendations for field crops: The Structure. Nutrient Management Information Series No. 2. Dept. Crop and Soil Sciences, Michigan State University

Warncke, D. and J. Dahl. 2003. Nutrient recommendations for vegetable crops: The Structure. Nutrient Management Information Series No. 3. Dept. Crop and Soil Sciences, Michigan State University

Warncke, D., J. Dahl, C. Laboski and L. Jacobs. 2003. Nutrient management recommendations for field crops grown in Michigan. MSU Ext. Bul. (In preparation)

### **IMPACTS**

The impacts of this GREEN funded project will increase as the developed programs, MSUFR (fertilizer recommendation) and MSUNM (nutrient management), and associated materials are adopted and receive increasing use.

- Users of the MSU Nutrient Management (MSUNM) record-keeping program indicate savings of over \$10,000 annually through better management of on-farm (manures) and purchased nutrients (fertilizers). Savings are greater for larger farming operations.
- Farmers are better able to comply with GAAMPS, CNMPS and other regulations using the MSU Nutrient Management complete record-keeping program. It saves them time as well as money.
- Farmers using MSU recommendations and nutrient management programs can reduce input costs and/or improve the return on their investment in nutrient inputs by 5 to 20 dollars per acre
- The new MSUFR program coupled with MSUNM will facilitate better communication of soil test data and nutrient management information to extension personnel, consultants, farmers and other stakeholders.
- Extension Agricultural Agents will be better able to assist their stakeholders to manage and document nutrient inputs via the new MSUFR2 and MSUNM programs.