

Continuing Report From Vermont for the New England Regional USDA Water Quality Grant (Section 406: Section 2 (Program Area 110.2), Agricultural Best Management Practices)

Title: Implementing Effective Comprehensive Nutrient Management Plans in Vermont

Duration: 2000 to 2004

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Introduction

National objectives for improving water quality will be supported by farmer adoption of Comprehensive Nutrient Management Plans (CNMP) as outlined in the Unified National Strategy for Animal Feeding Operations (USDA-EPA, 1998). Farm management plans which address non-point sources of pollution by manure, fertilizer and pesticides will require a complete set of field records describing properties, ownership, resources and allocations and costs of production inputs. Farmers will need education, decision-making tools and support systems to develop and implement effective CNMPs.

Project Goal

The goal of this project is to help Vermont farmers to develop and implement effective CNMPs. This will be a highly coordinated effort of university research, education, and extension personnel, partnering with state and federal agency personnel, farmers, industry representatives, and private consultants. This project will focus on the high priority, multi-state and international watersheds of the Lake Champlain Basin, the Connecticut River, and Lake Memphramagog which make up the vast majority of Vermont's agriculture. Project methodologies and outcomes will be transferable throughout New England, and elsewhere.

Background

There are many resources and tools for farmers to use for building Comprehensive Nutrient Management Plans. A part of this project is to educate farmers and others of the many resources available.

Computer software tools are available for farmers to use in developing site specific nutrient management plans. The Vermont CropMD© record-keeping program is currently being used by farmers throughout the state to track field-specific management practices and nutrient balances. As part of this project, a new version, the CropMD© database software has been expanded and revised - in cooperation with Pennsylvania State University agriculture computer group - by adding decision-making modules for farmers and consultants for environmental assessment and nutrient management planning.

Additional software tools (which can be downloaded from the Vermont Crops and Soils Homepage) available for farmers and consultants include the Vermont Manure Nutrient

Manager and the Vermont Phosphorus Index Calculator. Basic information on soil testing, manure management and nutrient management can be found in the Nutrient and Manure Management section of the Vermont Crops and Soils Homepage.

One concept for utilizing local resources for developing CNMP's is the Farm Advisory Team. Composed of representatives of different agricultural industries and agencies, farm advisory teams have been shown to be effective in helping farmers to improve their management skills and adopt improved production practices.

Project Objectives and Activities

Objective 1. Revise and evaluate the Vermont CropMD© database software for use as a nutrient management planning tool for dairy farms in Vermont

Create an improved management tool for farm application by revising the current version of the Vermont CropMD©1.0v1 (Pruss and Carter, 1998) - a field-specific crop record-keeping computer database program - to include additional decision-aid modules for assistance to farmers and their consultants in developing an effective plan for comprehensive nutrient management on their farm. Data collection, management plan development and reporting summaries will reflect the current goals expressed by both the State of Vermont (VDAFM, 1996) and Natural Resource Conservation Service (NRCS, 1999) for improving water quality.

- A. Modify CropMD©1.0v1 software to more fully integrate with currently available software (Jokela et al., 1998) into additional database modules for a holistic farm management tool. Secure a time commitment for computer programming technician at PSU to incorporate the following modifications prescribed by UVM Extension.
 - 1) Comprehensive nutrient management planning (USDA-EPA, 1998)
 - 2) GIS based data files import, plan mapping and report integration with most current state and federal agency requirements for environmental compliance.
 - 3) Environmental assessment for nutrient management (NRCS, 1999) (VDAFM, 1996)
 - 4) Phosphorus Index calculation (Jokela, 2000)
 - 5) Revised Crop enterprise reports

- B. Publish and distribute a CD Rom version of the CropMD©2.0v1 software which includes help files and tutorials for first-time users. The conversion to a CD Rom format will help with easier on-farm computer installation and allow us to continue with a less-expensive run-time version for individual computer use.

- C. Evaluate the impact of the adoption and use by farmers of the CropMD©1.0v1 field-record system on whole-farm nutrient balances, Best Management Practices (BMP) implementation, and crop enterprise economics.

Impact From Objective 1

A new version of CropMD (CropMDv2) was developed and made available on CD in 2001 that incorporated a nutrient management planning section plus environmental assessment and Phosphorus Index calculations. The program was demonstrated at the 2001 Nutrient Management In-Service Training (see below) in February and March of 2001 and at other extension meetings. The program was further improved in 2003 (CropMDv3). Since 2001, 130 farmers and consultants have been trained and have copies of the program. A survey was made in 2003 to evaluate the effectiveness of the program. Of the initial return of 47 surveys, 81% wish to continue using the CropMDv3 software.

Jeff Carter has worked closely with the NRCS State Agronomist and the software developers to adapt the nutrient management software program, AFOPro, for use in Vermont. This has involved reviewing and revising soil and crop parameters and providing input to incorporate UVM's soil test program and nutrient recommendations. The Vermont version of the software has recently been released for use in the state.

Objective 2: Develop and carry out an integrated statewide extension educational program on comprehensive nutrient management planning

Several approaches were used over a four-year period to provide information, education and assistance to farmers, consultants and sales/service providers concerning CNMP.

1. Producer Meetings

Several producer meetings have either been directly focused on nutrient management or involved part of their topics concerning soils, nutrient management and water quality. Below includes a list of the most important ones.

- **Managing Phosphorus - From Feeding to Fertilizing** (Feb. 2000) – this was a two hour program offered over Vermont Interactive Television to 10 locations in the state and was attended by 50 farmers, consultants and agency personnel. For this one program, we linked in Dr. Larry Satter, a nationally recognized animal nutritionist, to talk about his research on lowering P content of dairy feed. We also had Dr. Fred Magdoff to speak on soil P and Jeff Carter to discuss Nutrient Management Planning. At the end of the program, 93% of the dairy producers indicated that information from the program would be used on their farm. When asked to be specific, they indicated the following (% response): reduce P in feed (70%), reduce P fertilization (7%), reduce P pollution (11%), improve waste management (7%), soil test (22%), keep better records (11%), whole farm p management (19%).
- **Winter Dairy School** (2001) – Approximately 60 dairy producers participated in the all day program that included as section on Nutrient Management Planning and the Phosphorus Index (no evaluations)

- **Developing Nutrient Management Plans (2002)**– three one-day workshops cosponsored by UVM Extension, NRCS, and the Poultney/Mettawee Conservation District (no evaluations)
- **EQIP/Nutrient Management Workshop (2003)** – two producer meetings co-sponsored by UVM Extension and USDA-NRCS to explain the EQIP (Environmental Quality Incentive Program) program and discuss Nutrient Management Planning. Jeff Carter used these meetings to discuss NM planning and demonstrate the Crop MD software program. There were 18 farmer participants indicating an increase in their knowledge of EQIP participation and comprehensive nutrient management plan development and implementation.
- **Soil Quality Workshops (2003)** - These workshops, field days and farm walks focused on practices that have the potential to improve and maintain soil quality ultimately leading to improved water quality. A total of 64 farmers and agricultural professionals attended one of two workshops held on farms located within an impaired watershed. Of the attendees 62% responded that information learned at the workshop would result in a change in soil management practices on their farm. Some changes in soil management that were listed by attendees included evaluation of organic residues returned to soil, rotate land back into sod, monitoring nutrient cycling, and reducing tillage.
- **Managing Phosphorus on the Farm (2004)** – a set of three one-day meetings to highlight crop, soil and feeding strategies for managing phosphorus (no evaluation)

2. In-Service Trainings for Agricultural Professionals and Service Providers

A major role of the UVM Extension Agronomy and Nutrient Management group is to work with agricultural professionals when then distribute their expertise to producers. With this grant, we were able to provide in-depth information about the development and implementation of CNMP.

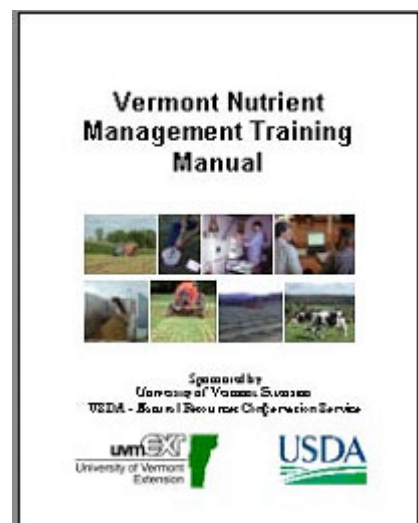
- **Vermont Nutrient Management In-Service Training - 2001** - A four-day training sponsored by UVM Extension and USDA-NRCS held at four locations in Vermont during February and March of 2001 to train NRCS personnel, crop consultants, and fertilizer dealers about whole-farm nutrient management planning. Participants received a comprehensive manual. The objective of the program was to provide tools and information for developing a farm nutrient management plan for farmers and nutrient planners. There were 94 participants. In an evaluation made on the last day of the program, over 75% agreed or strongly agreed that the program "gave me a good understanding of the components of nutrient management planning." Over 69% agreed or strongly agreed that the program "helped me know what I need to meet NRCS standards for nutrient management planning." And over 64% agreed or strongly agreed that the program "provided me with the information I need to become a certified nutrient management planner (both oral and written content)."
- **Phosphorus Index Workshops (2003)** – a hands-on workshop (two locations) involving computer training and in-field evaluations for assessing the Phosphorus Index for making environmental risk assessments when developing nutrient management plans. There were 30 participants representing NRCS, Conservation

Districts, crop consultants, private industry and extension. The program was well received with positive evaluations (average ~4.5 on 1-5 scale for format, preparation, met my needs, effective teaching, etc.).

- **Vermont Nutrient Management In-Service Training – 2004**– an advanced training two-day program as a follow-up to the first In-Service Training conducted in 2001. There were 57 attendees from NRCS, Conservations Districts, crop consultants, private industry, others. (Twice the expected attendance). A revised Training Manual was provided. Overall, the program was well received. Of the four major areas covered in the workshop (Basic soil/nutrient/manure management; Risk assessment of P and N; Putting a NM plan together; and Software demonstration), it was the latter two that were most valuable to participants. This was probably due to the fact that 66% of the participants had attended more than 2 other NM related workshops within the past three years and over 45% of the participants felt that they had “quite a bit” of background/knowledge in the area of nutrient management before attending this workshop while 34% of the others indicated they had “some” knowledge. Due to this evaluation, our curriculum needs to adjust for a more sophisticated audience.
- **New England In-Service Training for Certified Crop Advisors and Agriculture Service Providers** - a two-day program, which has been offered every year (usually in early February) since 1991. Attendance has grown from about 40 to 65. Collaboration by various New England Extension Specialists (with primary coordination by John Jemison, Un. of Maine). Usually half the program involves soil or nutrient management. Over the past four years, Vermont Specialists have conducted seven presentations. (Evaluations conducted by J. Jemison)

3. Publications

- **Vermont Nutrient Management Training Manual** – a comprehensive manual (3 ring binder) covering the basics in soils, soil fertility, manure management, nutrient management planning, and environmental assessment. It also contains an example nutrient management plan. It was used as the training manual for a statewide in-service training in 2001 with 120 produced and revised for an advanced training in 2004 (60 produced).



- **The Vermont Crops and Soils Homepage** – The Nutrient and Manure Management section (<http://pss.uvm.edu/vtcrops/?Page=nutrientmanure.html>) of this web site contains many articles and links concerning nutrient management and water quality. Topics (and links) include:
 - Nutrient recommendations for Field Crops in Vermont
 - Articles on fertilizer and manure management
 - Phosphorus Index background information, instructions and an Excel spreadsheet download.
 - Information on State and Federal Laws and Rules concerning nutrient management and water quality
 - Research reports from the University of Vermont concerning soils, soil fertility, nutrient and manure management
 - Links to other important nutrient management sites

- Report prepared by Sid Bosworth, Dept. of Plant and Soil Science, UVM, 3/11/04