

**Evaluation of
Nutrient Management Training--2004**

Sponsored by

**Michigan State University Extension
and
Natural Resource Conservation Services (NRCS)**

Submitted to

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NRCS Nutrient Management Training 2004

Executive Summary

For the past 50 years, soil testing has been considered when making fertilizer recommendations. Recommendation equations, as well as conceptual models have been developed by soil fertility specialists in Michigan, Ohio and Indiana for specific crops (Warncke et al., 2004). The Natural Resource Conservation Service (NRCS) realizes that good soil management is the key to successful crop yields and growth.

The Nutrient Management Training class held during the summer of 2004 was conducted to fulfill a new requirement by the national and state NRCS. The NRCS is seeking to serve farmers through trained private consultants, called Technical Service Providers (TSPs) by providing training that a TSP needs to take part in to be considered qualified to make nutrient management plans. For example, there are web based classes they need to take, in addition to taking a 2-day, class room session to fulfill their requirements. In 2002, The Farm Bill increased conservation investment from \$1.8 billion to \$3.9 billion. NRCS and locally-led partners committed to getting this new funding out quickly and efficiently. Helping build a new industry of certified professionals from the private sector, non-profit organizations, and public agencies to provide direct technical assistance and deliver conservation activities helped with this new commitment. Technical assistance by TSPs includes conservation planning and design, layout, installation, and checkout of approved conservation practices (NRCS.gov).

The goal of the NRCS Nutrient Management Training was to train industry, agency and soil conservation district consultants, and NRCS and private consultants in nutrient management. The training was specifically geared towards how nutrients relate to manure being recycled for crop production. This included background on general crop production nutrients such as nitrogen, phosphorus and potassium from both fertilizers and manures. The students were taught this basic information, and then were taught how to utilize this information for development of a 12-month manure and fertilizer application plan for livestock producers. Both classroom lectures and in-class worksheet/assignments and even a take home assignment to assist in their comprehension of the topics were used during the training program.

An analysis of the NRCS Nutrient Management Training course that took place over the summer of 2004 to fulfill new requirements offers several insights. An important finding is that the training session was a success. There was a significant change in knowledge and understanding of nutrient management practices among participating Technical Service Providers (TSPs). All consultants or agency personnel who worked with producers on nutrient management also benefited from this hands-on training on soils and nutrient management.

Major Findings of this Study

- The majority of participants in this training were NRCS Employees.
- The biggest change in knowledge or understanding on topics presented in the training was in “Understanding of nutrient recommendation philosophies”, while the smallest change in knowledge or understanding on a topic that was presented in the training was in “Knowledge about soil surveys”.
- The in-class homework assignment was more useful than the take-home assignment; the majority of students in the class (42%) said that they only completed some of the take-home assignment, while 35% said they did all of the assignment and 23% said they did not complete the assignment at all.
- 29 participants responded that the training was “About at my current knowledge level”, while 27 responded that the training was “Above my current knowledge level”. Four participants responded that the training was “Much above my current knowledge level” and 0 responded that the training was “Much below my current knowledge level”.
- 3 out of 4 participants responded that they had completed the NRCS web-based Nutrient Management Course, and 3 out of 4 participants responded that they had Previously attended three-day CNMP training.
- 64% of the course participants said they would recommend this training to others, while 27% said that they might recommend it.
- Some of the participants made general comments and suggestions on their evaluation tool, although they had not been prompted to. Two of the most insightful comments included:

“Overall, these were very useful tools and procedures. I’ve learned some tools that will help in planning and providing a better product to my clients. The biggest drawback was the inability (at times) to answer questions in detail. If you are going to continue doing this as a two-day session, the participants should have solid prior experience in many of these areas. If I hadn’t been working on a current CNMP, this might have been too confusing or overwhelming.”

“Speakers should be careful of using too many abbreviations in slides as they are distracting to decipher. Hands-on work was very useful and a great learning tool. Be careful of overly technical presentation of materials in presentations when the point has already been made. Environmental impacts were a lot of review. Don’t assume participants can calculate nutrients based on product formulations; this was still very new to me.”

Evaluation of NRCS Nutrient Management Training 2004

Introduction

It has been known since agriculture began that fertilizer is necessary to improve plant growth. For more than 5,000 years, flooding and silt deposits (in the Fertile Crescent), and slash and burn land clearing (practiced in Northern Europe) have been used to yield more crops (Advanced Bio-Tech). Although the science of fertilizers and soil nutrient management may not have been completely understood by ancient civilizations, manure has been used as a fertilizer for more than 2,000 years. Since the early 1900s, fertilizer recommendations have been classified by a simple system that included the type of crop being grown, soil texture and how often fertilizer had been applied. Now, making fertilizer recommendations for a farmer or livestock producer is much more complicated, not only because of advances in technology, but also because of environmental concerns (Warncke et al., 2004).

For the past 50 years, soil testing has provided important information for making fertilizer recommendations. Recommendation equations, as well as conceptual models have been developed by soil fertility specialists in Michigan, Ohio and Indiana for specific crops (Warncke et al., 2004). The Natural Resource Conservation Service (NRCS) realizes that good soil management is the key to successful crop yields and growth.

A two-day nutrient management training class held during the summer of 2004 was conducted to fulfill a new state and national NRCS requirement. The NRCS seeks to serve farmers through trained private consultants, called Technical Service Providers (TSPs). The organization provides training that qualifies TSPs to make nutrient management plans for livestock producers. Potential TSPs must also take Web-based classes, in addition to taking the two-day, classroom session to fulfill their requirements.

The 2002 Farm Bill increased conservation investment from \$1.8 billion to \$3.9 billion. NRCS and locally-led partners are committed to distributing funding quickly and efficiently. They are building a new industry of certified professionals from the private sector, non-profit organizations and public agencies to provide direct technical assistance and deliver conservation activities for this new commitment. TSPs assistance includes conservation planning and design, layout, installation, and inspection of approved conservation practices (NRCS.gov).

The goal of the NRCS Nutrient Management Training was to educate and train industry, agency and soil conservation district consultants, NRCS and private consultants, MSU Extension agents and agribusiness representatives about nutrient management. The training was focused on manure recycling and making nutrients available for crop production. This included background on general crop production nutrients such as nitrogen, phosphorus and potassium from both fertilizers and manures. The students learned this basic information, and then were taught how to use what they learned to develop 12-month manure and fertilizer application plans for livestock producers. Students took part in classroom lectures and completed in-class worksheet/ assignments and a take home assignment to assist in their comprehension of the topics presented during the program.

One of the course's major focus areas, and the main topic of the first day of training, was on bio-solids and their use in nutrient management for farm land in Michigan. Bio-solids are "solid, semisolid and liquid residues generated during the treatment of sanitary sewage, or domestic sewage, in treatment works treating domestic sewage" (Jacobs, 2001). MSU nutrient management extension agents are looking in to the possibility of using bio-solids from treated waste for land application to crops. Not only do bio-solids contain "appreciable amounts of essential nutrients for plant growth, especially N[itrogen] and P[otassium]", but they also can "improve the physical, chemical and biological properties of the soil" by increasing water infiltration, reducing soil erosion, increasing water-holding capacity, reducing soil compaction and increasing soil granulation, and increasing the ability of soil or surface material to retain nutrients, provide nutrients for plant growth and provide food and energy for beneficial soil microorganisms (Jacobs, 2001).

The second day of training focused on developing an ecologically and environmentally sound nutrient management plan for producers, including both fertilizer and manure nutrients. These plans would be applicable for producers who want to develop Comprehensive Nutrient Management Plans (CNMPs). The class, along with the Web-based prerequisite listed in the application (Appendix A) fulfills the NRCS requirement equivalent to being a Certified Crop Advisor (CCA) for CNMP Total Plan Development. The course was aimed at consultants and agency staff members who work with producers on nutrient management. These are the workers that would benefit from this practical background on soils and nutrient management in Michigan.

The nutrient management training course was held at the Banquet and Conference Center of DeWitt, in DeWitt, Michigan. The cost of the class was \$150.00 per student, which included snacks, lunch and materials. Each student received 13 CCA credits for attending the class. Speakers for the class included Dr. Carrie Laboski, MSU Crops and Soils Department, Fertility Specialist; Dr. Lee Jacobs, MSU Crops and Soils Department, Fertility Specialist; Dr. Darryl Warncke, MSU Crops and Soils Department, Soils Specialist; Natalie Rector, MSU Extension, Nutrient Management Specialist; Jerry Grigar, NRCS – MI State Agronomist and Mike Gangwer, NRCS – MI Nutrient Management Specialist.

Methodology

The training was promoted through an existing mailing list of participants in Michigan who had attended similar nutrient management programs in the past and via a news release that was distributed to agriculture and general media outlets. The training was required for NRCS employees. The Michigan Groundwater Stewardship program technicians were encouraged to attend the training event. Job opportunities such as raises and promotions depend on their continued education and improvement in this area. Of the three groups recruited for the training, eighty-three people attended the two-day training event.

At the end of the two-day event, a course evaluation form was distributed to assess the value of information offered by this training and its impacts. The evaluation form was designed to document change in participants' knowledge and their intention to apply this knowledge. The subject areas included soil surveys, confidence in soil sampling and using MSU fertilizer recommendations, understanding nutrient recommendation philosophies, and effects of pH on

nutrients. Other areas covered during the training included topics on Nitrogen and Prosperous, using manure and other organic fertilizers, and developing a 12 month CNMP.

Of the eighty-three participants who attended the training, sixty-nine completed and returned the course evaluation form. The data were entered into a database using Statistical Package for the Social Sciences (SPSS). Frequencies, descriptive statistics, cross-tabulation and t-tests were run to analyze the data. The findings are presented below.

Analysis and Findings

Participants were asked to indicate their main profession. Findings in Table 1 show that twenty-three out of sixty nine (i.e., 33.3%) participants were NRCS employees and the majority of them indicated having more than six years of experience. Other participants who completed this evaluation were groundwater technicians, engineers, environmental and/or conservation consultants, crop consultants and others.

Table 1. Main profession of participants

Main Profession	Number	Percent (%)
NRCS Employee with less than 6 years experience	5	7.2
NRCS Employee with more than 6 years experience	18	26.2
Engineer	6	8.7
Crop Consultant	5	7.2
Environmental/Conservation Consultant	6	8.7
Groundwater Technician	7	10.1
Other	22	31.9

Participants were asked if they had completed, prior to attending this training, a NRCS web-based nutrient management course. Similarly, they were asked if they have previously attended a 3-day training on comprehensive Nutrient Management Program (CNMP). Findings in Table 2 show that almost three out of four (74% each) had participated in either the web-based course or the CNMP course, or both. Two respondents indicated they had completed the training, but indicated that they had only completed “most” of the training. Of those that responded that they had not, or didn’t know if they had completed the web-based course, three were currently enrolled but had not finished their training whereas one person was planning on enrolling for the training in the future.

A cross-tabulation of main professions of respondents and prior training on nutrient management showed that all NRCS employees and Crop Consultants who attended the course had previously taken the Web-based training. Approximately 40% of those who said they had completed the web-based course were NRCS employees. All of the NRCS employees with over six years of experience had attended the three-day CNMP training. Similarly, 40% of those who said they had completed the CNMP three-day training course were NRCS employees.

Table 2. Prior training on nutrient management

	Yes	Don't Know	No
Complete NRCS web-based Nutrient Management Course, prior to this training? (n = 66)	51 (74%)	1 (2%)	14 (20%)
Previously attended three-day CNMP training? (n = 69)	51 (74%)	-	18 (26%)

Change in Knowledge of Nutrient Management

The topics that were covered during the two-day training session are presented in Table 3. Participants were asked, on a scale of 1-5 (with 1 being low and 5 being high), to rate their perceived level of competence — knowledge and understanding of the subject matter. As shown in Table 3, there were changes in mean scores between “prior to training” and “after training” on the level of knowledge and understanding in all areas of training. There were, however, some respondents who indicated no knowledge change for some of the topics. For example, a respondent may have indicated a level 4 knowledge of soil surveys prior to training and a level 4 knowledge of soil surveys after training.

The topic that had the highest change in knowledge was “understanding various nutrient recommendation philosophies,” which had a change in mean score from 2.81 (s.d. = 1.00) to 3.96 (s.d. = 0.76). The topic with the second highest change was confidence level to make a fertilizer recommendation using MSU guidelines and information of soil test reports. The mean score on this item changed from 2.61 (s.d. = 1.15) to 3.65 (s.d. = 0.97).

The topic that had the lowest change in mean score, by far, was general knowledge about soil surveys. The mean score prior to training was 4.01 (s.d. = 0.87) and the mean score after training was 4.28 (s.d. = 0.64), a change of only 0.27. Other topics that showed smaller changes in knowledge or understanding included “understanding how pH affects nutrient availability (mean = 3.23, s.d. = 1.13 to mean = 3.94, s.d. = 0.80)” and “knowledge about methods of Nitrogen soil testing (mean = 3.26, s.d. = 1.12 to mean = 3.96, s.d. = 0.85)”.

One of the evaluation questions asked specifically about the value of the in-class exercise for highlighting the differences in soil sampling schemes. This question was asked on the same five-point scale as other knowledge/understanding questions, with 1 designating a “Low” value and 5 designating a “High” value. The mean score for this question was 3.61 with a standard deviation of 1.09 meaning that the in-class exercise was of value.

SPSS was used to determine if significant differences existed between mean scores for “prior to training” and “after the training” ratings. A two-tailed independent sample t-test was used to determine the differences. Findings in table 3 show that there was a change in knowledge and understanding mean scores on all topics covered in the training program. Average scores for “after the training” were significantly higher for all topics as compared to “prior to training” scores.

Table 3. Change in knowledge and understanding

	Mean score* prior to training (Std. Dev.)	Mean score* after training (Std. Dev.)	t-value	Sig.
Knowledge about soil surveys	4.01 (.87)	4.28 (.64)	4.07	.00
Confidence level in determining how to soil sample	3.51 (1.16)	4.28 (.86)	7.65	.00
Understanding of nutrient recommendation philosophies	2.81 (1.00)	3.96 (.76)	9.92	.00
Confidence of making fertilizer recommendations	2.61 (1.15)	3.65 (.97)	9.83	.00
Understanding of how lime reacts with soil to adjust pH	3.09 (1.07)	3.93 (.85)	8.76	.00
Understanding of how pH affects nutrient availability	3.23 (1.13)	3.94 (.80)	7.32	.00
Knowledge of gains/losses of N regarding fertilizer application	3.32 (1.05)	4.06 (.77)	7.92	.00
Knowledge of methods of N soil testing	3.26 (1.12)	3.96 (.85)	7.33	.00
Knowledge of P availability from fertilizer and manure	3.37 (.95)	4.07 (.83)	8.41	.00
Knowledge of P soil test levels in developing nutrient management	3.52 (1.12)	4.26 (.84)	8.59	.00
Knowledge of manure and other organic inputs	3.54 (1.04)	4.28 (.75)	8.52	.00
Knowledge about developing 12 month nutrient plan	3.18 (1.25)	4.03 (.89)	8.20	.00

*Mean score is based on a 5 point scale with 1 being “Low” and 5 being “High”.

In-Class Exercises and Activities

Participants were asked to provide feedback on in-class exercises and hands-on activities. This included a take-home assignment and in-class exercise. They were asked if the take home assignment was completed, and whether or not the assignment and in-class exercises were useful. The majority of participants (42%) said that they only completed some of the take-home assignment, while 35% said they did all of the assignment. About one-fourth (23%) said they did not attempt to complete the assignment. Participants indicated that the in-class exercise was more useful than the take-home assignment.

Many participants provided written comments about the homework for the course. Several of these comments were related to inadequacy of instructions and appropriate formulas provided to participants. As a result, some participants expressed frustration. One participant wrote, “I think this would have been more informative as an in-class exercise,” while another said that the assignment “went too fast for me”, and still another said “it would be better to go step by step through the process for better understanding and clarity.”

Table 4. Responses about in-class exercises and activities

Activities	Yes Number (%)	Some/ Maybe Number (%)	No Number (%)
Did you do the take home assignment? (n = 69)	24 (35%)	29 (42%)	16 (23%)
Was the take home assignment useful? (n = 55)	26 (47%)	19 (35%)	10 (18%)
Were the in-class exercises useful? (n = 57)	32 (56%)	20 (35%)	5 (7%)

General Comments and Suggestions

Although not prompted by any of the questions asked on the evaluation tool, many participants wrote comments on the strengths and weaknesses of the training, and offered suggestions or recommendations for future nutrient management courses. Overall, the comments were positive and had specific suggestions for additional information that should be presented during the course. Some comments were related to in-class exercises and homework assignments.

Examples included:

“The class was well thought out...The delivery system after the CNMP is developed-- needs to be worked out. There also needs to be information on how to do nutrient management plows for all areas where manure is and not used.”

“Overall, these were very useful tools and procedures. I’ve learned some tools that will help in planning and providing a better product to my clients. The biggest drawback was the inability (at times) to answer questions in detail. If you are going to continue doing this as a two-day session, the participants should have solid prior experience in many of these areas. If I hadn’t been working on a current CNMP, this might have been too confusing or overwhelming.”

“Most people attending the course were concerned with manure, and not fertilizer, and a lot of the participants do not make nutrient management recommendations.”

“This class should be longer. Presenters should have the right calculations. They could organize much better.”

“June is a bad time for training. This course crams too much into a short time period. By noon, most people were shut down.”

“Speakers should be careful of using too many abbreviations in slides as they are distracting to decipher. Hands-on work was very useful and a great learning tool. Be careful of overly technical presentation of materials in presentations when the point has already been made. Environmental impacts were a lot of review. Don’t assume participants can calculate nutrients based on product formulations; this was still very new to me.”

Level of Information Compared to Current Knowledge

Participants were asked to rate the overall level of information offered by the training compared to their current level of knowledge and understanding. Provided with five choices, none of the participant indicated that information was “Much below my current knowledge level.” Eight of them indicated that the information was “Below my current knowledge level.” Almost two out of five (29 participants) indicated that the information was “About at my current knowledge level” or “Above my current knowledge level” (27 participants). Only four indicated the information was “Much above my current knowledge level.”

A cross tabulation of the “level of information” presented during training and prior training showed that four out of five participants who *had* completed the web-based training indicated that the level of information was “about the same” or “above” their current level of knowledge. Similarly, of those who said they had *not* completed the web-based training, seven participants indicated that the training was “about the same” and another seven indicated that the training was “above” their current level of knowledge.

A second cross tabulation for previously completing a CNMP training course showed that the majority of those who *had* completed the CNMP training indicated the level of information as “about the same” or “above” current levels of knowledge. The majority of those who had *not* completed the CNMP training, 78%, also indicated the level of information presented was “about the same” or “above” current levels of knowledge. It should be noted, here, that 17% of the participants who had *not* attended the CNMP course indicated that the information presented was “below” their current level of knowledge, meaning that they already had greater knowledge and understanding of the subject matter.

These findings suggest that there was a variation in background knowledge among participants. Although the training content was appropriately designed to meet the informational needs of the majority of participants, others might have found the content below their current knowledge level. Future training sessions should address these differences in participant backgrounds.

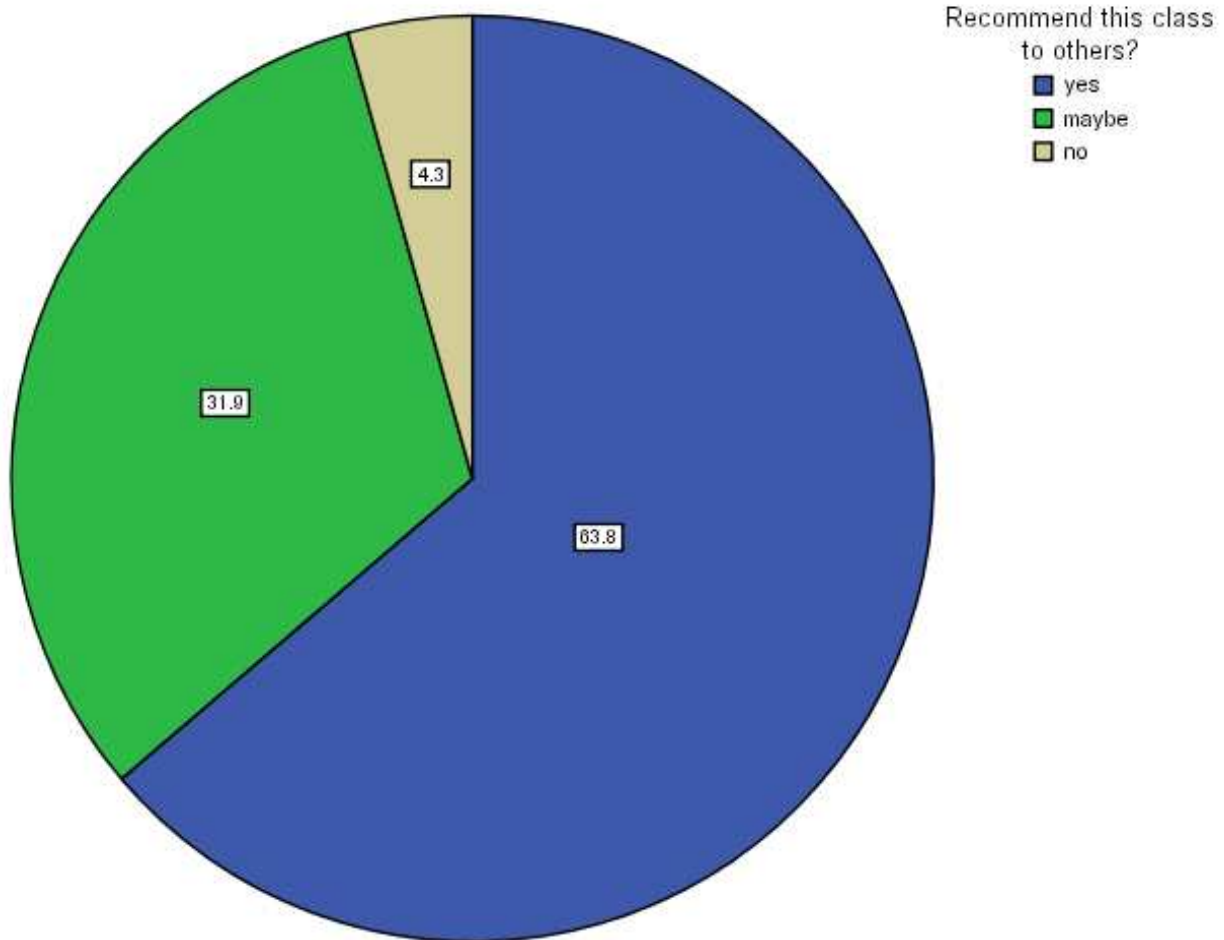
Recommendation of this Course to Others

Participants of the Nutrient Management Course were asked if they would recommend this training to others. Findings in Figure 1 show that twice as many respondents indicated they would recommend this training to others (44) over those who said they *might* recommend this training. Three participants said they would not recommend this training to others while one participant commented that s/he would recommend the course “only if [the] colleague had no prior soil/crop science training.”

A cross tabulation of participants’ main professions and recommendation of the course to others showed that the majority of respondents who would recommend the training were NRCS employees. Of the 37 NRCS employees responding to this question, over three-fourths (78%) said they would recommend this training to their colleagues, while less than one-fourth (22%) “might” recommend it to other NRCS staff. Only three participants, one NRCS employees, one engineer and one designating them self as “other”, said “no”, they would not recommend this

training. The professional group that was most likely to recommend this training to others was NRCS employees with more than six years of experience.

Figure 1. Would you recommend this course to others (N=69)?



Conclusion

An analysis of the NRCS Nutrient Management Training course reveals several conclusions. The goal of the course was to train industry, agency and soil conservation district consultants, and NRCS and private consultants in nutrient management. Focusing on how nutrients relate to manure being recycled for crop production, this training included background on general crop production nutrients such as nitrogen, phosphorus and potassium from both fertilizers and manures. The participants were taught basic information on nutrient management and were provided with information for development of a 12-month manure and fertilizer application plan for livestock producers. Classroom lectures, an in-class exercises and take home assignments were used to assist in the comprehension of the subject matter.

Findings from this evaluation show that the majority of those who benefited most from the training were NRCS employees, both with more and less than six years of experience. The

majority of the participants who had completed the web-based training and three-day CNMP training course were also NRCS employees. The analysis of prior and future training suggests that most participants in this training had taken the web-based class or are considering taking the web-based class, in addition to taking the two-day, classroom session to fulfill requirements.

T-test results show a statistically significant change in mean scores of knowledge and understanding of nutrient management practices by Technical Service Providers (TSPs) who attended training. Any consultant or agency person who worked with producers on nutrient management benefited from this practical background on soils and nutrient management in Michigan. Overall, participants provided positive feedback to this evaluation. However, they suggested changes to training curriculum to improve the course in the future. Overall, the training program was a success.

References

- Jacobs, Lee W. and Deliana S. McCreary. "Applying Bio-solids to Land in Michigan". *Extension Bulletin E2780* (December 2001): 1-8.
- Natural Resources Conservation Service. *TechReg Information*. United States Department of Agriculture. 17 August 2004 <<http://techreg.usda.gov/>>
- Soil, Plant and Crop Enhancement:History of Agriculture*. Advanced Bio-Tech, California. 17 August 2004 <<http://www.adbio.com/science/agri-history.htm>>
- Warncke, Darryl, Jon Dahl, Lee Jacobs and Carrie Laboski. "Nutrient Recommendations for Field Crops in Michigan". *Extension Bulletin E2904* (May 2004): 3-30.



**Nutrient Management Training
NRCS Module 7 Course Equivalent**

Tuesday June 22 8:30 – 4:30

Wednesday June 23 8:15 – 4:30

Cost: \$150 per person, includes snacks, lunch and materials.

Make Checks payable to MSU Extension Calhoun County and mail with the registration form below.

CCA Credits: 13 CCA credits will be provided for attendance to both days.

Location:

Banquet and Conference Center of DeWitt, DeWitt Michigan

(Directions: Take I-69 to exit 87 (DeWitt/Old 27), go north 1/3 mile, located on right, behind Burger King and across the parking lot from Sleep Inn.)

Lodging:

Sleep Inn of DeWitt, within walking distance to conference center. Call 517 669-8823

Amerihost, 1.5 miles south of the conference center, call 517-374-0000.

Course Goals and Objectives: Any consultant or agency person who works with producers on nutrient management will benefit from this practical background on soils and nutrient management in Michigan, including in class exercises. The second day will focus on developing a nutrient management plan for producers, including both fertilizer and manure nutrients, that is agronomically and environmentally sound. These plans would be applicable for producers seeking Comprehensive Nutrient Management Plans (CNMPs). This class, along with the web based prerequisite listed below, fulfills the NRCS requirement equivalent to being a CCA for CNMP Total Plan Development.

If you are not a CCA, before attending the class, be sure to take the web based course “NEDC Nutrient Management Considerations for Conservation Planning” Modules 1-6

<http://www.nedc.nrcs.usda.gov/catalog/nutandpest.html>

Speakers:

Dr. Carrie Laboski	MSU Crops and Soils Department, Fertility Specialist
Dr. Lee Jacobs	MSU Crops and Soils Department, Fertility Specialist
Dr. Darryl Warncke	MSU Crops and Soils Department, Soils Specialist
Natalie Rector	MSU Extension, Nutrient Management Specialist
Jerry Grigar	NRCS – MI State Agronomist
Mike Gangwer	NRCS – MI Nutrient Management Specialist

Agenda

Day One

- Soil Survey
- Soil Sampling and Spatial Variability
- Nutrient Recommendation Philosophies
- MSU Fertilizer Recommendations and Interpreting Soil Test Reports
- Soil pH, Liming, and Gypsum
- Developing Fertilizer Recommendations from a Crop Budget - Strategy

Take home exercise
All about Nitrogen

Day Two

Developing Fertilizer Recommendations from a Crop Budget – Results
Review Take home exercise
Potassium as a Cation
All about Phosphorus
Manure and Organic Inputs
Developing a Manure Spreading Plan as Part of a Whole Farm Agronomic Budget
Planning Procedures using the 590 Nutrient Management and 633 Waste Utilization NRCS Standards

Whole Farm Scenario: a whole farm nutrient budget will be completed by teams using technical material covered in this class, including the 590 and 633 NRCS Standards. This two hour exercise will focus on the big picture, including how to measure fertility, how to interpret soil tests, how to develop a crop budget using expected crop yields, how to use animal manure in the crop budgets, and how to develop fertilizer recommendations. This exercise will require participants to decide what information they need, how to get it, what do with these data, and how to develop a Comprehensive Nutrient Management Plan.

For more information contact Sharon Williams at williash@msue.msu.edu or 269-781-0786.

Registration Due: June 10, 2004.

(a refund less \$50 will be returned for cancellations prior to June 10)
Make checks payable to MSU Extension Calhoun County and mail to:
MSU Extension
315 W. Green, Suite 1-700
Marshall, MI 49068

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