

NUTRIENT MANAGEMENT: A BEST MANAGEMENT PRACTICE FOR CLEAN WATER

Crops absorb nutrients from the soil such as nitrogen (N) and phosphorus (P) to grow. Nitrogen is abundant in animal manure, ammonium fertilizer, crop residues, and in the nodules of leguminous plants, while phosphorus is found in human waste and livestock manure, and in the form of “rock phosphate.”

A **Nutrient Management Plan (NMP)** defines the *nutrient needs of crops, and how best to provide the amount, sources, placement and timing of nutrient applications to maximize plant uptake, and improve yield.* Certified Crop Advisers (CCAs) and Certified Professional Agronomists (CPAGs), both certified by the American Society of Agronomy (ASA) through meeting exam, education, experience and ethics standards, work closely with producers to develop NMPs that estimate nutrient needs based on yield goals, while minimizing environmental risk.

Historically, the concept of nutrient management was very simple. Producers estimated the nutrients needed by the crop by subtracting the *amount of nutrients available* in the soil (obtained through soil sampling and testing) from *optimal level of nutrients needed* to obtain yield goals (obtained from crop response data). They then applied the nutrients needed through the application of either manure or fertilizer. Today, however, in addition to this simple calculation of nutrient requirement, producers and CCAs take into consideration many more factors when developing NMPs that account for areas sensitive to soil erosion, soil characteristics, potential for

nutrient loss (using nitrogen leaching indices and models such as the “Phosphorus-Index”, and the Revised Universal Soil Loss Equation (RUSLE2)), crop rotations, and tillage practices. Certified Crop Advisers must now use new tools to address this complexity including geographic mapping (GIS/GPS), manure, soil, and plant tests, conservation planning software, best management practices, and more versatile crop varieties.

Three broad cost categories associated with NMPs are preparation, implementation, and record keeping/maintenance. Specific costs associated with each category can vary greatly by region depending on local constraints. Nutrient Management Plans also impose non-monetary costs that cannot be easily quantified by the farmer such as the amount of time required to complete paperwork and potential loss of confidential business information. Moreover, difficulties surface because some benefits are not manifested immediately. However, federal and state conservation programs offer incentives to producers, compensating them for initial losses when adopting best management practices as part of a nutrient management plan.

America leads the world in the production of food and fiber in part due to the widespread use of fertilizers containing nitrogen (N) and phosphorus (P). Producers’ adoption of Nutrient Management Plans ensures a future of clean water without compromising America’s agricultural heritage.

NUTRIENTS IN THE LANDSCAPE: THE ROLE OF TECHNICAL SERVICE PROVIDERS



What is a Certified Crop Advisor?

A Certified Crop Adviser (CCA) is a certified professional who provides crop management recommendations to farmers based on industry standards that accomplish environmental stewardship objectives.

CCA TOOLBOX



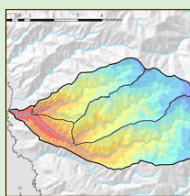
Soil, Manure, and Plant Tests
ISU Extension



Best Management Practices



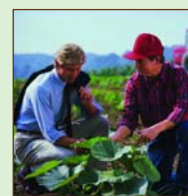
Planning Software



Geographic Information
From CSU: Monterey Bay



Nutrients
Iowa State University



On Site Evaluation



Considerations and Practices for Nutrient Management

NITROGEN

- Pre-Nitrogen Sidedress Test (PNST)
- Nitrogen Source
- Nutrient Additives (nitrification inhibitors, urease inhibitors)
- Nutrient placement
- Previous N contribution
 - Compost application
 - Crops

PHOSPHORUS

- Manure and biosolids applications for P requirements, not N
- Buffer strip use

ON THE FARM

- Application of nutrients at appropriate times
- Use of GIS and field map development
- Soil Nutrients
- Use of local expertise
 - Extension Agents
 - Crop Advisers
- Variable rate fertilizer application (using a programmable fertilizer spreader) depending on area of the farm
- Avoidance of nutrient application near 'at risk' areas

Costs of Nutrient Management

Include (but not limited to) the following:

PREPARATION COST

- Soil sampling—depends on intensity of sampling, size of farm, and region of US
- Soil analysis
- Plan development and preparation

IMPLEMENTATION COST

- Precise placement of fertilizer
- Potential yield reduction

RECORDKEEPING & MAINTENANCE COSTS

- Hours spent by producer/TSP creating and sending reports to regulatory agencies
- Potential cost of loss of confidential business information

BIOS

Dr. Frank Coale

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Dr. Coale is currently a professor and department chair at the University of Maryland, Department of Environmental Sciences and Technology. His research interests primarily concern environmental impacts of phosphorus. Phosphorus mismanagement is a great concern for farmers in the Chesapeake Bay watershed area. Dr. Coale has several collaborative projects examining the role of agricultural management on phosphorous loss. He also helped develop software designed to aid in creating phosphorus management plans for Maryland farmers. Dr. Coale received his PhD in 1986 from University of Kentucky in Soil Fertility, after receiving his M.S. in 1983. He received his B.S. from the University of Maryland in Agronomy-Crop Science.

Steve Cromley

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Steve Cromley is a staff Agronomist and Certified Crop Adviser (CCA) at MFA Incorporated in Columbia, MO where he manages the Technical Service Provider (TSP) program. In his job as an agronomist, Mr. Cromley, who has worked with corn, wheat and soybeans, consults with producers to develop and implement nutrient management plans (NMPs). He also mentors Crop Advisers who seek certification. Prior to his work with MFA Inc., Mr. Cromley served as an extension associate and developed and implemented training programs to teach nutrient management planners how to use nutrient management planning software. Mr. Cromley has a BS in Agronomy from Missouri State University and a Masters degree in Agronomy from the University of Missouri.

Steven Oetting

Oetting Hog Farms, Inc.
 Concordia, MO

Steve, his wife Sharon, and son, Sean, are full-time employees of Oetting Hog Farms, Inc., a family-owned, birth-to-market hog operation that markets 2,400 head annually and farms 650 acres of no-till corn and soybeans in the rolling hills of western MO. All of the crop ground on his farm utilizes an assortment of conservation practices, including terraces and underground tile lines. Cool season grasses and trees are planted with cost-share support under the Riparian Buffer CRP program. Conservation Reserve Program applications are also in use on less productive hillsides. The Oetting's farm is located in a Conservation Security Program priority watershed which allows them to enroll 230 acres of their land in CSP programs. The Oetting's Environmental Quality Incentive Program (EQIP) contract has enabled them to consult with CCA Steve Cromley and use grid sampling for variable rate fertilizer application to best predict plant needs. Oetting utilizes lagoon water to meet some nutrient requirements and is in the process of developing a Comprehensive Nutrient Management Plan (CMNP).

Dr. Raymond E. Massey

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Dr. Massey has worked with interdisciplinary teams investigating the impact of Environmental Protection Agency (EPA) regulations on the pork industry. The team provided comments to the EPA regarding phosphorus-based manure applications that were largely incorporated into the final rule. He continues to develop educational programs that assist farmers in maximizing the value of the manure while minimizing the cost of management. Massey received his PhD in 1990 from Oklahoma State University in Agricultural Economics, his MA in Agricultural Economics from New Mexico State University in 1982, and a BS in Animal Science also from New Mexico State in 1979.

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