

PHASE 6 NUTRIENT MANAGEMENT EXPERT PANEL

APRIL 21, 2016

IDENTITY AND EXPERTISE OF PANEL MEMBERS

Name	Affiliation	Role
Frank Coale	University of Maryland	Panel Chair
Deanna Osmond	North Carolina State University	Panel Member
Doug Beegle	Penn State University	Panel Member
Jack Meisinger	USDA-Agriculture Research Service	Panel Member
Tom Fisher	UMCES	Panel Member
Quirine Ketterings	Cornell	Panel Member
Chris Brosch	Delaware Department of Agriculture	Watershed Technical Workgroup representative
Matt Johnston	CBPO	Modeling Team representative

Technical support provided by Mark Dubin (University of Maryland), Lindsey Gordon (CRC Staffer), and Steve Dressing (Tetra Tech).

PRACTICE NAME(S)

- Nutrient Management Core N
- Nutrient Management Core P
- Nutrient Management Supplemental N Rate Adjustment
- Nutrient Management Supplemental N Placement Adjustment
- Nutrient Management Supplemental N Timing Adjustment
- Nutrient Management Supplemental P Rate Adjustment
- Nutrient Management Supplemental P Placement Adjustment
- Nutrient Management Supplemental P Timing Adjustment

DEFINITION OF THE ~~LAND USE OR~~ PRACTICE

Nutrient management has four basic components: the nutrient type, rate, timing, and placement which are managed on a field scale, or on a within-field scale, in a manner which is consistent with high N-use efficiency and/or high P-use efficiency in order to minimize nutrient loss to the environment while maintaining crop yield. These four basic components interact with each other

on a site-specific basis due to the varying degrees of interactions among the N and P basic components, as further modified by local soil properties and weather conditions. Thus, the Nutrient Management Panel defines Nutrient Management as the implementation of a site-specific combination of nutrient type, rate, timing, and placement into a strategy for N and P with the goal of improving nutrient-use efficiency, along with the documentation of the nutrient management strategy implementation that is suitable for verification.

Nutrient Management also provides other important benefits to the agricultural and the environmental communities. These benefits include the long-standing education of producers into basic and state-of-the art nutrient management practices/tools, establishing an initial base-line for nutrient management to allow estimating progress over time, and improved communication with other Expert Panels that will provide better coordination of each Panel's BMPs.

Nutrient management for the Phase 6 is separated into independent sets of elements for nitrogen (N) and phosphorus (P) management due to the marked difference in the fate and transport of these nutrients in agricultural systems. The structures for both N and P nutrient management are similar, however, with supplemental management elements stacked onto a required core set of management elements. The panel will further refine the definitions and equivalent practice elements for core and advanced supplemental N and P practices in the final panel recommendation report.

Nutrient management is the execution of a combination of management actions, methods and tools designed to achieve the optimum use of agronomic nutrients to minimize nutrient loss to the environment while maintaining crop yield. Components of nutrient management address the type, rate, timing, and placement of nutrients for each crop.

Nutrient management for the Phase 6 Model is separated into unique sets of elements for nitrogen (N) and phosphorus (P) management. The structures for both N and P nutrient management are similar, however, with supplemental management elements stacked onto a required core set of management elements. The panel will further refine the definitions and equivalent practice elements for core and advanced supplemental N and P practices in the final panel recommendation report.

Nutrient Management Core N: The core set of N management elements consists of:

NITROGEN Core Nutrient Management BMP (ALL core elements required to be implemented and verified)
N rate according to LGU recommendations at field level
Manure analysis and volume - test value or book value
Spreader/appligator calibration
Yield estimates and cropping plan at field level
Cropping and manure history at field level

Nutrient Management Core P: The core set of P management elements consists of:

PHOSPHORUS Core Nutrient Management BMP (ALL core elements required to be implemented and verified)
P rate according to LGU recommendations at field level
P soil tests at field level

Manure analysis and volume - test value or book value
Spreader/applicator calibration
Yield estimates and cropping plan at field level
Cropping and manure history at field level

Nutrient Management Supplemental N: Credit for advanced supplemental N management elements requires satisfactory implementation of all respective N core management elements. The advanced assessment N tools are utilized to inform the application of the appropriate N adjustment practices, but do not represent an N credit in and of themselves.

N Rate Adjustment Practice (implementation of one or more BMPs required)
N rate less than LGU recommendations
Split N applications <u>for reduced total rate</u>
Variable rate N application

N Placement Adjustment Practice (implementation of one or more BMPs required)
Subsurface injection or incorporation of applied <u>Inorganic N</u>
N application setbacks from water

N Timing Adjustment Practice (implementation of one or more BMPs required)
Split N applications

Advanced N Assessment Tools
PSNT
Manure analysis < 3 years old
On-farm replicated research
CSNT
N-loss risk assessments & models - Ammonia loss
Yield mapping
ISNT
On-farm strip trials
N-loss risk assessments & models - Leaching loss
FSNT
N-loss risk assessments & models - Denitrification losses
Whole farm balances
In-season sensors/remote sensing in general
Geo-spatial mapping

Nutrient Management Supplemental P: Credit for advanced supplemental P management elements requires satisfactory implementation of all respective P core management elements. The advanced

assessment P tools are utilized to inform the application of the appropriate ~~N~~P adjustment practices, but do not represent a P credit in and of themselves.

P Rate Adjustment Practice (implementation of one or more BMPs required)
P-based manure rate based on <u>annual</u> crop P removal
P rate less than LGU recommendations
Variable rate P
Split P applications

P Placement Adjustment Practice (implementation of one or more BMPs required)
Subsurface injection or incorporation of applied <u>inorganic</u> P
P application setbacks from water

P Timing Adjustment Practice (implementation of one or more BMPs required)
P application in lower P-loss risk season

Advanced P Assessment Tools
Soil test P remediation/declining
Soil tests < 3 years old
P Index assessment
Grid soil sampling
Manure analysis < 3 years old
On-farm replicated research
Yield mapping
On-farm strip trials
Whole farm balances
Geo-spatial mapping

QUALIFYING PRACTICE CONDITIONS

Credit for core nutrient management N and P requires all respective core elements to be implemented and verified. Credit for advanced supplemental N and P management elements requires satisfactory implementation of all respective N and P core management elements first before receiving credit for implementing and verifying respective N and P supplemental elements. The advanced assessment N and P tools are utilized only to inform the application of the appropriate N and P adjustment practices, but do not represent a unique N or P credit by-in-of themselves. The implementation of the supplemental adjustments for rate, placement, and/or

[timing for N and/or P provides the recommended advanced supplemental nutrient management credits.](#)

PRACTICE MODEL SIMULATION DESCRIPTION

Core nutrient management for N and P is represented as an annual efficiency practice for N and P application rates respectively. Advanced supplemental N and P practices are represented as an edge of field to edge of stream delivery reduction efficiency. The panel is recommending that 1985 conditions be used as the baseline for representing practice efficiencies and implementation, [which is consistent with other agricultural BMPs and other Phase 6 Expert Panels.](#)

LAND USES TO WHICH THE PRACTICE IS APPLIED

Core [and advanced supplemental](#) elements of nutrient management [for both N and P practices](#) apply to [the following partnership approved Phase 6 agricultural land uses:](#) ~~full season soybeans, grain with and without manure, silage with and without manure, legume hay, small grains and grains, small grains and soybeans, specialty crop high and low, other agronomic crops, other hay, and pasture.~~

Land Use	Description
Full Season Soybeans	Soybeans ineligible for double cropping
Grain with Manure	Corn or sorghum for grain eligible for manure application and ineligible for double cropping
Grain without Manure	Corn or sorghum for grain ineligible for manure application and ineligible for double cropping
Silage with Manure	Corn or sorghum for silage eligible for manure application and ineligible for double cropping
Silage without Manure	Corn or sorghum for silage ineligible for manure application and ineligible for double cropping
Legume Hay	Legume forage crops eligible for manure
Small Grains and Grains	Small grains and grains other than corn or sorghum eligible for manure and ineligible for double cropping
Small Grains and Soybeans	Soybeans double cropped with small grains and ineligible for manure
Specialty Crop High	Specialty crops with relatively high nutrient inputs with some crops eligible for manure
Specialty Crop Low	Specialty crops with relatively low nutrient inputs with some crops eligible for manure
Other Agronomic Crops	Other high commodity row crops such as tobacco, cotton, etc., with some crops eligible for manure
Other Hay	Non-legume forage crops eligible for manure
Pasture	Grazed land that receives direct manure deposition from animals

UNIT OF MEASURE

Core nutrient management can be reported in either acres or percentage of acres implementing the practice.

LOCATIONS WITHIN THE CHESAPEAKE BAY WATERSHED WHERE THIS PRACTICE IS APPLICABLE

Nutrient management can be applied to specified land uses everywhere within the Chesapeake Bay watershed.

POTENTIAL METHODS TO ESTIMATE HISTORIC IMPLEMENTATION UNITS

The Panel recommends that historic implementation on a state-by-state basis be based on the premise that the baseline of 1985 is set at zero, or near zero acres for Nutrient Management Core N and Core P implementation, and the highest level of implementation be represented at 2015 reported implementation acreages. The increasing level of historic implementation between these two points on a state-by-state basis may be represented as a straight line linear progression if there is a paucity in the absence of implementation data, or inferred by state implementation data representative of the definitions of nutrient management proposed by the panel. Historic implementation estimation shall consider additional sources of nitrogen and phosphorous reduction credits commensurate with State QAPPs currently in place, given they are consistent with the BMPs and efficiency credits described by the Nutrient Management Expert Panel.

In utilizing the Panel's practice recommendations for tracking and reporting practice implementation, the Panel recommends that acres, or percentage of acres, be reported by Phase 6 land use, or grouping of similar land uses, by year as an annual practice. Nutrient Management Core N and P are stand-alone practices which should be tracked and reported separately. Likewise, advanced supplemental N and P practices should be tracked and reported separately, but only when the corresponding Core N or P elements have been met by the Panel's recommended practice definitions.

POTENTIAL FOR PANEL ADJUSTMENTS IN FINAL REPORT

The Panel is fairly confident in the definition of core nutrient management elements and advanced supplemental practices, as evidenced by their unanimous voice approval for these components, but the components could be modified because the final quantitative practice efficiencies have not been determined. Efficiencies for both nitrogen and phosphorus will be decided upon for the final report. Decisions on efficiencies will be based on the panel's recommendations for agronomic nutrient distribution to be represented by the Phase 6 model.

Step #2: Fertilizer PHOSPHORUS Application Goal by Land Use per County

Total P Application Goal (pounds) – Manure P (pounds) = Fertilizer P application goal (pounds)

Note: At this point, Fertilizer P Application Goal is limitless.

Step #3: Fertilizer PHOSPHORUS Application Goal per County

Sum of all Fertilizer P Application Goals for all land uses within a county

Step #4: Fertilizer PHOSPHORUS Application Goal Supply Limit per County

A = Fertilizer P application goal

B = Redistributed AAPFCO Fertilizer P Sales

If $A < B$, then A = Fertilizer P application goal limits fertilizer P supply

If $A > B$, then B = Redistributed AAPFCO Fertilizer P Sales limits fertilizer P supply