PHASE 6 COVER CROPS EXPERT PANEL

APRIL 21, 2016

IDENTITY AND EXPERTISE OF PANEL MEMBERS

Name	Affiliation	Role
Ken Staver	University of Maryland	Panel Chair
Charlie White	Penn State University	Panel Member
Jack Meisinger	USDA – Agriculture Research Service	Panel Member
Paul Salon	USDA-Natural Resources Conservation Service	Panel Member
Wade Thomason	Virginia Tech	Panel Member
Jason Keppler	Maryland Department of Agriculture	Watershed Technical Workgroup representative
David Wood	Chesapeake Bay Program Office	Modeling Team representative

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

PRACTICE NAME(S)

- Traditional Cover Crops
- Commodity Cover Crops

DEFINITION OF THE LAND USE OR PRACTICE

The Traditional Cover Crops BMP is currently defined as a short-term crop grown after the main cropping season to reduce nutrient losses to ground and surface water by sequestering excess nutrients. No additional nutrients are applied in either the fall or spring, and the cover crop is terminated without harvesting. The following traditional cover crop species have associated N, P, and sediment reduction efficiencies in the Phase 5.3.2 model:

- Rye
- Wheat
- Barley
- Annual Ryegrass
- Annual Legumes
- Brassica (winter hardy)
- Forage Radish
- Forage Radish plus Grass Mixtures
- Triticale
- Oats (winter hardy)

- Annual Legume plus Grass Mixtures
- Oats (winter killed)

The Phase 5.3.2 cover crop panel did an in depth review of the literature to determine cover crop effects on nitrate leaching and major changes in values determined by that panel are not anticipated. Cover crop effects on surface runoff N, P and sediment have been much less studied in the Bay watershed and were not determined by the previous panel. This Panel will explore modeling approaches for estimating cover crop effects on surface runoff nutrient and sediment losses. This Panel also will review whether traditional cover crops should be considered as a nutrient reduction practice on sites where manure is applied in late summer and fall on cropland. While ideally manure is not applied on cropland in the fall, because manure storage structures for non-stackable manure generally are not designed to hold 365 days of production, manure is applied to significant crop land areas in the bay watershed in late summer and early fall. These situations are prone to high nitrate losses and cover crops have been shown to be useful for reducing those losses. This issue will reviewed in conjunction with the P6.0 nutrient management expert panel.

The Commodity Cover Crops BMP is currently defined as a modification of winter cereal grain production to reduce nutrient losses to ground and surface water by scavenging soil nutrients and delaying nutrient applications until close to the period of peak uptake. No nutrients are applied in the fall, however additional nutrients can be applied in the spring after March 1. Commodity cover crop can be harvested. The following commodity cover crops have an associated N reduction efficiency: rye, wheat, and barley. This panel will add triticale to this list. A complicating factor for the Commodity Cover Crop practice is that currently proposed land uses in the P6 model do not represent the fall part of the winter cereal grain production cycle. This panel will consider options for representing that part of the production cycle.

Important elements of the cover crop practice include selection of the cover crop species, the planting date, the seeding method, and the preceding crop. One advantage of the P6 model is that cover crops can be associated with particular preceding crops which will help capture the added reduction benefit gained by targeting cover crop use to settings with the highest potential for nutrient loss. Cover crops are one of the most valuable management practices available for protecting water quality, especially groundwater quality, which is a difficult resource to protect from non-point sources of soluble nutrients like nitrate N. Traditional and commodity cover crops are approved practices in the Phase 5.3.2 Chesapeake Bay Program Watershed Model.

QUALIFYING PRACTICE CONDITIONS

Fall application of nutrients currently disqualifies a winter cereal crop from consideration as a cover crop but as discussed above, the Panel will review issue in settings where fall manure application cannot be prevented. The Panel has also discussed issues of planting date and nutrient reduction efficiencies attributed to cover crops – a lower efficiency is applied to later-planted cover crops. The wide climatic range of the CB Watershed makes it necessary to consider heat unit accumulation rather than a calendar date approach to quantifying the cover crop effectiveness.

The Panel is discussing several complex issues of commodity cover crops. For example, how should nutrient reduction efficiency be calculated when the cover crop is part of a double crop production system? Another key challenge is historical production practices for winter cereals compared to commodity cover crop standards. A reduction credit for commodity cover crops is based on the

extent to which nutrient applications are changed from standard practice. The Panel also will be considering the issue of the Commodity Cover Crop practice relative to credit for nutrient management to avoid the possibility of double counting. This issue also will consider consultation with the P6 nutrient management panel.

Practice Model Simulation Description

Traditional cover crops will be represented as annual efficiency practice. The Panel is considering whether the commodity cover crop practice should be treated as annual efficiency practice as it currently is in the Phase 5.3.2 models, as a reduced nutrient application, or some combination. Cover crops are annual practices.

Land uses to which the practice is applied

Traditional cover crops can be applied to row crop land, including soybeans, corn grain, corn silage, small grains, sorghum, specialty crop, and other agronomic crops. The fall part of the production cycle for commodity cover crops could be applied to these crop types as well, but the harvest part of the cycle is represented by the P6 winter cereal land uses. The panel is reviewing this issue.

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
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

Unit of measure

Cover crops can be reported in acres or percentage of acres implementing the practice.

Locations within the Chesapeake Bay watershed where this practice is applicable

Cover crops can be applied to specified land uses everywhere within the Chesapeake Bay watershed. Opportunities for adequate establishment and growth of both traditional and commodity cover crops may diminish in northern regions of the watershed due to shorter growing season.

The Panel is considering a heat unit approach as a way to normalize planting times across the watershed.

Potential Methods to Estimate Historic Implementation Units

Identification of potential methods to estimate historical cover crops – especially commodity cover crops – is challenging. The Panel has discussed the fact that baseline conditions with respect to cover crops have never been fully laid out. Over the last several decades, changes in crop varieties, crop yields, the amount of N recommended or applied, the timing of nutrient applications, and tillage practices have changed so significantly that establishing historical cover crop implementation has been difficult.

Potential for Panel adjustments in final report

The Panel is generally satisfied with the basic definition of a cover crop and with the recommended nutrient reduction efficiencies reported in Phase 5.3.2. However, the Panel notes that the Phase 5.3.2 EP evaluated the reduction efficiencies of individual species primarily as pure stands, with only a simplistic averaging approach to estimating efficiencies of mixed cover crop stands. The Phase 6 EP intends to apply current research data to improve estimates of nutrient reduction efficiencies for mixed-species cover crops.

The Panel also notes that issues of nutrient management, double-cropping, and crop rotation may confound the development of nutrient reduction efficiencies for commodity cover crops.

Finally, the Panel recognizes that data on P reduction efficiency of cover cropping is scarce and that it be would be difficult to model cover crop effects on P losses without assumptions about soil test P levels to accompany soil loss modeling. As a result, the Panel may choose to not present any new recommendations for P reduction efficiencies after consideration of field-scale modeling options.