Conservation Tillage Panel Report

Panel Membership

Member	Jurisdiction	Affiliation
Ben Coverdale	Delaware	DE-Agriculture
Phillip Sylvester	Delaware	University of Delaware
Jack Meisinger	Maryland	USDA-ARS
Josh McGrath	Maryland	University of Maryland
Ken Staver	Maryland	University of Maryland
Royden Powell	Maryland	MD-Agriculture
Dale Gates	New York	USDA-NRCS-NY
Kevin Ganoe	New York	Cornell
Bill Clouser	Pennsylvania	PA-Agriculture
Sjoerd Duiker	Pennsylvania	Penn State University
Mark Goodson	Pennsylvania	USDA-NRCS
Bill Keeling	Virginia	VA-Environmental
Mark Reiter	Virginia	Virginia Tech
Rory Maguire	Virginia	Virginia Tech
Tim Sexton	Virginia	VA-Environmental
Wade Thomason	Virginia	Virginia Tech
Patrick Bowen	West Virginia	USDA-NRCS-WV
Tom Basden	West Virginia	West Virginia University
Neely Law		Center for Watershed Protection
Don Meals		Tetra Tech
Jennifer Ferrando		Tetra Tech
Mark Dubin		AgWG
Emma Giese		CBP

Existing CT Practices

1. Conventional Tillage:
   Model base condition expressed as a land use. Range of residue values from 0 to 29% at planting.
2. Conservation Tillage:
   Annual BMP expressed as a land use. Range of residue values from 30%+ at planting.
3. Continuous No-Till:
   Annual BMP expressed only as an effectiveness value with the CT land use. Incorporates cover crop and NM BMPs. Minimum 5 year CNT crop rotation required.

Panel Focus

- In order to maximize the potential impact of the panels' limited time and scope for potential revisions to the overall set of conservation tillage practices, the panel decided to focus emphasis directly on a "stackable" CNT practice.

Panel Focus

- After considerable time spent reviewing the literature and discussing the various effects of no-till practices, the panel agreed that the preponderance of evidence indicated that a high degree of soil cover, over 60%, had the greatest impact on water quality benefits.
- Research from soils and cropping systems within the Chesapeake Bay watershed and from similar conditions elsewhere suggests the effects on infiltration and sediment loss are predominantly determined by residue cover and not by soil disturbance per-se.

The **High-Residue, Minimum Soil Disturbance** practice

- The Continuous High-Residue Minimum Soil-Disturbance (HR) BMP is a crop planting and residue management practice in which soil disturbance by plows and implements intended to invert residue is eliminated. Any disturbance must leave a minimum of 60% crop residue cover on the soil surface as measured after planting. HR involves all crops in a multi-crop, multi-year rotation and the crop residue cover requirement (including living or dead material) is to be met immediately after planting of each crop.

- The purpose of implementing the HR BMP is to improve soil organic matter content and soil quality, and to reduce runoff and sediment and nutrient losses coupled with a continuous high-residue management system. Multi-crop, multi-year rotations on cropland are eligible. The system must be maintained for a minimum of one full crop rotation.

- The Chesapeake Bay Watershed Model has hi-till (0-29% crop residue or conventional tillage) crop land-uses and low till (30+% crop residue or conservation tillage) land-uses, but does not have an explicit land use that defines the properties of continuous HR with minimum soil disturbance. Since continuous HR will be considered a sub-set of the current conservation tillage land use, it is necessary to calculate the effects of HR as reduction efficiency relative to the efficiency already achieved by the conservation tillage land use. The continuous HR with minimum soil disturbance practice can be combined with other associated, applicable BMP's for additional reductions, including nutrient management and cover crops.

Tracking options

- This practice could be tracked through field transect surveys (CTIC methodology), through remote sensing and limited field transect surveys, or through state or federal programs that collect information on high-residue minimum disturbance practices. The current CTIC methodology would have to be revised to include a category specifically with >60% cover
- The panel discussed the importance of obtaining complete information about implementation of this practice. Therefore, information about implementation obtained through programs needs to be supplemented with other information to report acres where farmers practice HR voluntarily.

Panel Proposed HR BMP	
TOTN Uplands Continuous High-Residue Minimum Soil-Disturbance lbs/acre Low-Till → Continuous HR (Stackable) Load Reduction TBD	TOTN Coastal Plain Continuous High-Residue Minimum Soil-Disturbance lbs/acre Low-Till → Continuous HR (Stackable) Load Reduction TBD
TOTP Uplands Continuous High-Residue Minimum Soil-Disturbance lbs/acre Low-Till → Continuous HR (Stackable) Load Reduction TBD	TOTP Coastal Plain Continuous High-Residue Minimum Soil-Disturbance lbs/acre Low-Till → Continuous HR (Stackable) Load Reduction TBD
TSS Uplands Continuous High-Residue Minimum Soil-Disturbance tons/acre Low-Till → Continuous HR (Stackable) Load Reduction -64.0%	TSS Coastal Plain Continuous High-Residue Minimum Soil-Disturbance tons/acre Low-Till → Continuous HR (Stackable) Load Reduction -64.0%

Brief Citation and sediment reduction values between conservation tillage and high residue system from applicable peer-reviewed studies	% sediment reduction, Conservation Till to High-Res, Min Disturbance (NT)
Sm. Watershed-scale studies	
Shipitalo and Edwards, 1998	-61.5%
Staver, 2004	-67.5%
AVG	**-64.5%**
Small plot studies	
Verbree et al, 2010	-85.2%
Truman e al., 2005	-91.5%
Benham et al., 2007	-77.2%
Eghball and Gilley, 2001	-79.6%
Kleinman et al., 2009	-38.0%
AVG	**-74.3%**
15% small plot adjustment	**-63.1%**
RUSLE2 model runs	
Coastal Plain, 1% slope	-49%
Coastal Plain, 2% slope	-80%
Coastal Plain, 4% slope	-78%
Piedmont, 3-4% slope	-65%
Piedmont, 5-6% slope	-68%
Piedmont, 9-10% slope	-58%
Ridge & Valley, 3-4% slope	-66%
Ridge & Valley, 5-6% slope	-71%
Ridge & Valley, 9-10% slope	-70%
Plateau, 4% slope	-75%
Plateau, 6% slope	-77%
Plateau, 10% slope	-76%
AVG	**-69.4%**

Recommendations and Benefits

- The panel is recommending the HR practice and sediment reduction value for HR be treated as stackable with other applicable BMP's.
- At this time the HR practice will have no N or P reduction, however any reduction associated with other practices would be included.
- Until the final N and P reduction estimates for HR can be developed (2014) that the jurisdictions will still have the opportunity to report CNT (non-stackable).
- Acres can not be reported to both CNT and HR.
- States must choose the way that they will submit either HR or CNT. No mix and match.

Modeling considerations

- BMP Name: Continuous High Residue, Minimum Disturbance.
- Acres: Number of acres under HR meeting min. 60% residue.
- Location: Approved NEIEN geographies: County: (CBWS only) Hydrologic Unit Code (HUC12, HUC10, HUC8, HUC6, HUC4).
- Date: Year of implementation or continuation of HR system.

Summary

- HR CT only placed on Ag land already reported under CT.
- Can be placed in Model for LWM (low till with manure) and NLO (nutrient management low till).
- When fully implemented with P and TSS effectiveness values, will replace the current CNT.