A-3. Conservation Tillage

General information

Conservation tillage involves the planting, growing and harvesting of crops with minimal disturbance to the soil. The amount of crop residue coverage is higher when compared to conventional or high tillage methods, and the use of seeders and techniques that are more precise and require fewer passes reduce soil disturbance. Greater crop residue coverage and lower soil disturbance protect against erosion from wind and rain.

Figure A-3-1. Corn growth with crop residue. Crop residue is a mix of stalks, leaves, roots or other plant materials left on the field following harvest. The residue helps prevent erosion from wind and rain while allowing the next crop to grow through. Source: CTIC

CBP Definition(s)

Conventional Tillage: Any tillage routine that does not achieve 15 percent crop residue coverage immediately after planting is considered conventional tillage and does not qualify as a BMP.

Low Residue Tillage: A conservation tillage routine that involves the planting, growing and harvesting of crops with minimal disturbance to the soil in an effort to maintain 15 to 29 percent crop residue coverage immediately after planting each crop.

Conservation Tillage: A conservation tillage routine that involves the planting, growing and harvesting of crops with minimal disturbance to the soil in an effort to maintain 30 to 59 percent crop residue coverage immediately after planting each crop.

High Residue, Minimum Soil Disturbance Tillage: A conservation tillage routine that involves the planting, growing and harvesting of crops with minimal disturbance to the soil in an effort to maintain at least 60 percent crop residue coverage immediately after planting each crop.

Figure A-3-2. Rows grown in the ridge till method. Source: CTIC

Specifications or Key Qualifying Conditions

The tillage routine must maintain 15 percent or greater crop residue coverage immediately after planting to be considered a BMP. There are no additional specifications or qualifying conditions beyond those described in the definitions above.

Nitrogen, Phosphorus and Sediment Reductions

Nutrient reductions vary based on hydrogeomorphic region (HGMR), while sediment reductions are consistent across all regions. It is not expected that the specific HGMR of a farm field is known, instead the reported acres are distributed by the model. For example, if 50 percent of cropland in a county is in Piedmont Carbonate and 50 percent Piedmont Crystalline, then the conservation tillage acres submitted for that county are split 50/50.

DRAFT

Table A-3-1. Nitrogen, Phosphorus and Sediment Efficiency Value Reductions for Tillage Practices

HGMR	Nitrogen Reductions			Phosphorus Reductions			Sediment Reductions		
	Low Residue	Conser-vation Tillage	High Residue	Low Residue	Conser-vation Tillage	High Residue	Low Residue	Conser-vation Tillage	High Residue
Appalachian Plateau, Siliciclastic	0.05	0.1	0.14	0.07	0.17	0.27	0.18	0.41	0.79
Appalachian Plateau, Carbonate	0.05	0.1	0.14	0.07	0.27	0.38	0.18	0.41	0.79
Blue Ridge	0.05	0.1	0.14	0.08	0.5	0.63	0.18	0.41	0.79
Coastal Plain Dissected Upland	0.02	0.04	0.12	0.08	0.35	0.47	0.18	0.41	0.79
Coastal Plain Lowland	0.02	0.04	0.12	0.06	0.02	0.11	0.18	0.41	0.79
Coastal Plain Upland	0.02	0.04	0.12	0.07	0.16	0.26	0.18	0.41	0.79
Mesozoic Lowland	0.05	0.1	0.14	0.07	0.21	0.32	0.18	0.41	0.79
Piedmont Carbonate	0.05	0.1	0.14	0.09	0.6	0.74	0.18	0.41	0.79
Piedmont Crystalline	0.05	0.1	0.14	0.09	0.58	0.71	0.18	0.41	0.79
Valley and Ridge Carbonate	0.05	0.1	0.14	0.09	0.57	0.71	0.18	0.41	0.79
Valley and Ridge Siliciclastic	0.05	0.1	0.14	0.08	0.49	0.62	0.18	0.41	0.79

Specific reporting and modeling information

Applicable Land Use Types (or other load sources) Treated by the BMP:

- Full season Soybeans
- Grain with Manure
- Grain without Manure
- Silage with Manure
- Silage without Manure
- Small Grains and Grains
- Small Grains and Soybeans
- Specialty Crop High
- Specialty Crop Low
- Other Agronomic Crops

Because many of the land uses listed above represent rotational crops, it is not recommended that states track and report this level of detail. Instead, it is recommended that states report these acres on the land use group, "Crop," which contains all of the above individual land uses.

Figure A-3-3. Corn (left) and soybean (right) residue cover percentages (25, 50, 75, 90). The percentage of residue coverage increases from top to bottom for each crop in a column. Source: University of Nebraska Extension

Brief Description of BMP Simulation in the Model

All conservation tillage practices are *Efficiency Value BMPs*. Runoff from applicable load sources are reduced by the efficiency values listed in Table A-3-1. For example, if a state submits that 100 percent of acres within a county in the Appalachian Plateau Siliciclastic region are covered by High Residue Tillage Management, then nitrogen from all acres will be reduced by 14 percent, phosphorus by 27 percent and sediment by 79 percent as compared to the same land under conventional tillage. If however, only 50 percent of acres are reported for the same practice, then half the cropland in that county would be simulated as

DRAFT

conventional tillage and half would have the respective nitrogen, phosphorus and sediment reductions for the High Residue Tillage Management BMP applied.

Annual or Cumulative? Annual (1-year credit duration)

Can this practice be combined with other BMPs? Yes. See [insert link to overview] for example credit calculation for multiple practices.

Key Elements for State BMP Reporting through NEIEN

- *BMP Name:*
  - Low Residue Tillage may be reported under the names: Reduced Tillage
  - Conservation Tillage may be reported under the names: Conservation Tillage; Mulch Tillage; No Tillage, and; Ridge Tillage
  - High Residue, Minimum Soil Disturbance may be reported under the name: High Residue Tillage Management
- *Measurement unit:* Acres
- *Land Use:* Approved NEIEN agricultural land uses; if none are reported the default will be CROP
- *Geographic location:* Approved NEIEN geographies: County; County (CBW only); Hydrologic Unit Code (HUC12, HUC10, HUC8, HUC6, HUC4); State (CBW only)
- *Date of implementation:* Year residue was observed.

Table A-3-2. Synonymous BMP names for Watershed Model, NEIEN and other sources

CBP or Expert Panel term	NEIEN BMP name	Other common practice names
Low Residue Tillage	Reduced Tillage	NRCS 329
Conservation Tillage	Conservation Tillage Mulch Tillage No Tillage Ridge Tillage	NRCS 329 NRCS 345
High Residue, Minimum Soil Disturbance Tillage	High Residue Tillage Management	NRCS 329

Additional Information

Expert panel report:

Thomason, W., Duiker, S., Ganoe, K., Gates, D., McCollum, B., & M. Reiter. 2016. Conservation Tillage Practices for use in Phase 6 of the Chesapeake Bay Watershed Model. CBP/TRS-308-16. *http://www.chesapeakebay.net/documents/CT_6.0_Conservation_Tillage_EP_Revised_Full_Report_12-14-16.2_FINAL_NEW_TEMPLATE.pdf*

Example USDA NRCS National Conservation Practice Standards:
https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/cp/ncps/

Conservation Technology Information Center: https://www.ctic.org/

Version and History Statement

This info sheet was first published on MM DD, YYYY and reflects the BMP definitions and reductions approved by the WQGIT in December 2016.

All BMP effectiveness estimates are subject to potential future reviews according to the availability of new scientific information and CBP partnership needs, as defined in the BMP Review Protocol.

DRAFT