MANURE INJECTION/INCORPORATION EXPERT PANEL REPORT

AGRICULTURE WORKGROUP UPDATE

OCTOBER 20, 2016

Panel Members

Name	Affiliation	Role
Curt Dell	USDA-Agriculture Research Service	Panel Chair
Art Allen	University of Maryland – Eastern Shore	Panel Member
Dan Dostie	USDA-Natural Resources Conservation Service	Panel Member
Robb Meinen	Penn State University	Panel Member
Rory Maguire	Virginia Tech	Panel Member
Chris Brosch	Delaware Department of Agriculture	Watershed Technical Workgroup representative
Jeff Sweeney	CBPO	Modeling Team representative

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

Practice Categories

- Manure Injection
  - Low disturbance
  - Immediate incorporation
  - Slot closure

Practice Categories

- Incorporation: Low Disturbance
  - ≤30% residue retention (to be consistent with Conservation Tillage BMP)
  - Several tools possible, aerators and vertical tillage most likely
  - Incorporation within 24 hr of manure application for full N credit, 1-3d for a smaller credit

Practice Categories

- Manure Incorporation: High Disturbance
  - >30% residue retention
  - Full width tillage
  - Incorporation within 24 hr of manure application for full N credit, 1-3d for a smaller credit

PRIMARY BENEFITS

- GREATLY REDUCES N LOST AS AMMONIA
- REDUCED P LOSSES WITH RUNOFF (BOTH DISSOLVED AND SEDIMENT BOUND P)
- LIKELY IMPACTS N LOSSES WITH RUNOFF, BUT INSUFFICIENT DATA TO DETERMINE EFFICIENCY VALUE
- LEACHING LOSSES OF N AND P NOT TYPICALLY REDUCED BY INCORPORATION

CONSIDERATIONS

- N AND P LOSSES REDUCTION FACTORS RELATIVE TO UNINCORPORATED, BROADCAST APPLICATION.
- NO SEDIMENT REDUCTION FACTORS CONSIDERED (HANDLED THROUGH CONSERVATION TILLAGE PANEL)
- FULL CREDIT FOR AMMONIA VOLATILIZATION REDUCTION REQUIRES MANURE INCORPORATION WITHIN 24 HR. LOWER CREDIT VALUES PROVIDED FOR INCORPORATION WITHIN 1-3 DAYS (CONSISTENT WITH LGU GUIDELINES FOR N CONSERVATION CREDITS).
- INCORPORATION WITHIN 3 DAYS FOR P REDUCTION CREDIT

REGIONAL DIFFERENCES

- P REDUCTION FACTOR = RUNOFF P REDUCTION FACTOR X PORTION OF TOTAL P LOSSES WITH RUNOFF
- TWO SETS OF P FACTORS DUE TO DIFFERENCES IN CONTRIBUTION OF RUNOFF TO TOTAL P LOSSES
  - UPLAND REGIONS (PIEDMONT, RIDGE AND VALLEY, AND ALLEGHANY PLATEAU): ASSUMING 80% OF LOSSES WITH RUNOFF
  - COASTAL PLAIN : ASSUMING 48% OF LOSSES WITH RUNOFF
    - ASSUMING 60% OF LOSSES WITH RUNOFF ON WELL DRAINED SOILS (TYPICALLY NATURALLY DRAINED) (~75% OF CROPLAND)
    - ASSUMING 10% OF LOSSES WITH RUNOFF ON POORLY DRAINED SOILS (TYPICALLY DITCH OR TILE DRAINED) (~25 OF CROPLAND)

REDUCTION FACTORS FOR UPLAND REGIONS

	Nitrogen				Phosphorus			
Category	Time to incorp-oration	Ammonia emission reduction	Reduction in losses to water		Time to incorp-oration	Reduction in losses with runoff	% of total P losses with runoff	Reduction factor
Injection	0	85%	0%		0	45%	80%	36%
Low Disturb-ance Incorp-ation	≤24 hr 24-72 hr	50% 34%	0%		≤72 hr	30%	80%	24%
High Disturb-ance Incorp-oration	≤24 hr 24-72 hr	75% 50%	0%		≤72 hr	0%	80%	0%

REDUCTION FACTORS FOR THE COASTAL PLAIN

	Nitrogen				Phosphorus			
Category	Time to incorp-oration	Ammonia emission reduction	Reduction in losses to water		Time to incorp-oration	Reduction in losses with runoff	% of total P losses with runoff	Reduction factor
Injection	0	85%	0%		0	45%	48%	22%
Low Disturb-ance Incorp-ation	≤24 hr 24-72 hr	50% 34%	0%		≤72 hr	30%	48%	14%
High Disturb-ance Incorp-oration	≤24 hr 24-72 hr	75% 50%	0%		≤72 hr	30%	48%	14%

POTENTIAL TRADEOFFS

- HIGH DISTURBANCE TILLAGE CAN INCREASE SEDIMENT LOADING
- INJECTION COULD INCREASE LEACHING WHEN TILE DRAINS OR OTHER PREFERENTIAL FLOW PATHS PRESENT
- INJECTION CAN INCREASE NITROUS OXIDE EMISSION (GREENHOUSE GAS)

DATA LIMITATIONS

- RUNOFF DATA LARGELY FROM SIMULATED RAINFALL
  - GOOD RELATIVE COMPARISON BETWEEN PRACTICES
  - INFORMATION ON TOTAL LOSSES LESS PRECISE
  - EVENT-BASED, NOT SEASONAL OR ANNUAL DATA
- EFFECTS OF PRACTICES DEPEND ON SOIL TYPES, TOPOGRAPHY , AND SOIL AND WEATHER CONDITION AT APPLICATION
  - ADDS VARIABILITY TO PERFORMANCE OF PRACTICES IN THE FIELD
- LEACHING STUDIES LIMITED
- MORE INFORMATION OF NEEDED ABOUT INTERACTIONS WITH OTHER MANAGEMENT PRACTICES, SUCH AS COVER CROPS

VERIFICATION AND HISTORICAL RECORDS

- VERIFICATION THROUGH NUTRIENT MANAGEMENT RECORDS FOR DOCUMENTATION OF INCORPORATION TIMING
- INJECTION A RECENT PRACTICE, SO HISTORICAL USE NOT A FACTOR
- TILLAGE INCORPORATION COMMON IN PAST, BUT RECORDS OF INCORPORATION TIMING UNLIKELY BEFORE NUTRIENT MANAGEMENT REQUIREMENTS

PANEL REPORT TIMELINE

- CURRENT: PANEL REVIEWING DRAFT REPORT
- OCTOBER 31ST: DRAFT PANEL REPORT PROPOSED FOR RELEASE FOR PARTNERSHIP REVIEW
- NOVEMBER: PARTNERSHIP 30-DAY REVIEW PERIOD
- EARLY DECEMBER: DRAFT FINAL REPORT RELEASED FOR PARTNERSHIP REVIEW
- DECEMBER 15TH: AGWG/WTWG DECISIONAL MEETING
- DECEMBER 19TH: WQGIT DECISIONAL MEETING PROPOSED
- DECEMBER 31ST: RECOMMENDATIONS INCORPORATED IN THE PHASE 6 MODELING TOOLS


Questions?