MANURE INJECTION/INCORPORATION EXPERT PANEL REPORT

AGRICULTURE WORKGROUP UPDATE

NOVEMBER 21, 2016
# Panel Members

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
<th>Role</th>
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<tbody>
<tr>
<td>Curt Dell</td>
<td>USDA-Agriculture Research Service</td>
<td>Panel Chair</td>
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<tr>
<td>Art Allen</td>
<td>University of Maryland – Eastern Shore</td>
<td>Panel Member</td>
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<td>Dan Dostie</td>
<td>USDA-Natural Resources Conservation Service</td>
<td>Panel Member</td>
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<td>Robb Meinen</td>
<td>Penn State University</td>
<td>Panel Member</td>
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<td>Rory Maguire</td>
<td>Virginia Tech</td>
<td>Panel Member</td>
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<td>Chris Brosch</td>
<td>Delaware Department of Agriculture</td>
<td>Watershed Technical Workgroup representative</td>
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<tr>
<td>Jeff Sweeney</td>
<td>CBPO</td>
<td>Modeling Team representative</td>
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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
  • \( \leq 30\% \) 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 AND N LOSSES WITH RUNOFF (BOTH DISSOLVED AND SEDIMENT BOUND P)

• 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

• FINAL RECOMMENDATIONS INCLUDED SMALL CREDIT FOR RUNOFF N REDUCTIONS, ASSUMING N REDUCED BY AS PERCENTAGE AS P (BUT LOWER FRACTION OF N LOST WITH RUNOFF)
REGIONAL DIFFERENCES

- RUNOFF REDUCTION FACTOR = (RUNOFF P REDUCTION FACTOR) X (PORTION OF TOTAL P OR N 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)

- SINGLE N FACTOR FOR ENTIRE WATERSHED: ASSUMING 25% OF N LOSSES AS RUNOFF
## REDUCTION FACTORS FOR UPLAND REGIONS

<table>
<thead>
<tr>
<th>Category</th>
<th>Nitrogen</th>
<th>Phosphorus</th>
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<tbody>
<tr>
<td></td>
<td>Time to incorpor.</td>
<td>Ammonia emission reduction</td>
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<tr>
<td>Injection</td>
<td>0</td>
<td>85%</td>
</tr>
<tr>
<td>Low Disturb. Incorp.</td>
<td>≤24 hr</td>
<td>50%</td>
</tr>
<tr>
<td></td>
<td>24-72 hr</td>
<td>34%</td>
</tr>
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<td>High Disturb. Incorp.</td>
<td>≤24 hr</td>
<td>75%</td>
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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

• CURRENTLY: REPORT POSTED FOR PUBLIC COMMENT
• DECEMBER 3: COMMENT PERIOD CLOSES
• EARLY DECEMBER: DRAFT FINAL REPORT RELEASED FOR PARTNERSHIP REVIEW
• DECEMBER 15\textsuperscript{TH}: AGWG/WTWG DECISIONAL MEETING
• DECEMBER 19\textsuperscript{TH}: WQGIT DECISIONAL MEETING PROPOSED
• DECEMBER 31\textsuperscript{ST}: RECOMMENDATIONS INCORPORATED IN THE PHASE 6 MODELING TOOLS
Questions?