Technical Appendix for Cover Crop Panel Report

- Two proposals for reporting and crediting Cover Crops for Phase 6
  - Option A = no change from previous panel report appendix
    - 13 species * 3 planting types * 3 timing variations * 2 regions * 2 LU categories
  - Option B = simplified version for reporting and crediting

- Asking for a decision between these options

Potential Ways to Simplify Cover Crops

- Combine like species:
  - Option A (13)
  - Option B (4 groups) – Rye; Small Grains and Brassicas; Grasses, Oats and Radishes; Annual Legumes
- Combine like efficiencies for planting timing:
  - Option A (3) – Early, Normal, Late
  - Option B (2) – Early/Normal, Late
- Combine like efficiencies for planting type:
  - Option A (3) – Drilled, Other, Aerial
  - Option B (2) – Drilled, Other/Aerial
- Potential practices:
  - Option A (128) ⇨ 400^{+} efficiencies considering tillage and region
  - Option B (30) ⇨ 120 efficiencies considering tillage and region

Option A

Type	Species	Plant Date	Plant Method	TN Reduction	Type	Species	Plant Date	Plant Method	TN Reduction
Traditional	Rye	Early	Drilled	0.450	Traditional	Legume Plus Grass 25-50%	Early	Drilled	0.200
Traditional	Rye	Early	Other	0.380	Traditional	Legume Plus Grass 25-50%	Early	Other	0.170
Traditional	Rye	Early	Aerial	0.250	Traditional	Legume Plus Grass 25-50%	Early	Aerial	0.110
Traditional	Rye	Normal	Drilled	0.410	Traditional	Legume Plus Grass 25-50%	Normal	Drilled	0.190
Traditional	Rye	Normal	Other	0.350	Traditional	Legume Plus Grass 25-50%	Normal	Other	0.160
Traditional	Rye	Late	Drilled	0.190	Traditional	Triticale	Early	Drilled	0.390
Traditional	Rye	Late	Other	0.160	Traditional	Triticale	Early	Other	0.330
Traditional	Wheat	Early	Drilled	0.310	Traditional	Triticale	Early	Aerial	0.210
Traditional	Wheat	Early	Other	0.270	Traditional	Triticale	Normal	Drilled	0.350
Traditional	Wheat	Early	Aerial	0.170	Traditional	Triticale	Normal	Other	0.300
Traditional	Wheat	Normal	Drilled	0.290	Traditional	Triticale	Late	Drilled	0.160
Traditional	Wheat	Normal	Other	0.240	Traditional	Triticale	Late	Other	0.140
Traditional	Wheat	Late	Drilled	0.130	Traditional	Annual Ryegrass	Early	Drilled	0.300
Traditional	Wheat	Late	Other	0.110	Traditional	Annual Ryegrass	Early	Other	0.250
Traditional	Barley	Early	Drilled	0.380	Traditional	Annual Ryegrass	Early	Aerial	0.160
Traditional	Barley	Early	Other	0.320	Traditional	Annual Ryegrass	Normal	Drilled	0.270
Traditional	Barley	Early	Aerial	0.210	Traditional	Oats, Winter Hardy	Early	Drilled	0.250
Traditional	Barley	Normal	Drilled	0.290	Traditional	Oats, Winter Hardy	Early	Other	0.210
Traditional	Barley	Normal	Other	0.240	Traditional	Oats, Winter Hardy	Early	Aerial	0.140
Traditional	Forage Radish	Early	Drilled	0.260	Traditional	Oats, Winter Hardy	Normal	Drilled	0.230
Traditional	Forage Radish	Early	Other	0.220	Traditional	Oats, Winter Hardy	Normal	Other	0.190
Traditional	Forage Radish	Early	Aerial	0.140	Traditional	Oats, Winter Killed	Early	Drilled	0.180
Traditional	Forage Radish Plus	Early	Drilled	0.290	Traditional	Oats, Winter Killed	Early	Other	0.150
Traditional	Forage Radish Plus	Early	Other	0.250	Traditional	Oats, Winter Killed	Early	Aerial	0.100
Traditional	Forage Radish Plus	Early	Aerial	0.160	Traditional	Brassica	Early	Drilled	0.320
Traditional	Forage Radish Plus	Normal	Drilled	0.220	Traditional	Brassica	Early	Other	0.270
Traditional	Forage Radish Plus	Normal	Other	0.180	Traditional	Brassica	Early	Aerial	0.180
Traditional	Annual Legume	Early	Drilled	0.070	Traditional	Legume Plus Grass 50%	Early	Drilled	0.260
Traditional	Annual Legume	Early	Other	0.060	Traditional	Legume Plus Grass 50%	Early	Other	0.220
Traditional	Annual Legume	Early	Aerial	0.040	Traditional	Legume Plus Grass 50%	Early	Aerial	0.140
Traditional	Annual Legume	Normal	Drilled	0.060	Traditional	Legume Plus Grass 50%	Normal	Drilled	0.250
Traditional	Annual Legume	Normal	Other	0.060	Traditional	Legume Plus Grass 50%	Normal	Other	0.210

Option A

Type	Species	Plant Date	Plant Method	TN Reduction	Type	Species	Plant Date	Plant Method	TN Reduction
Traditional with Fall Nutrients	Rye	Early	Drilled	0.320	Traditional with Fall Nutrients	Oats, Winter Hardy	Early	Other	0.150
Traditional with Fall Nutrients	Rye	Early	Other	0.270	Traditional with Fall Nutrients	Oats, Winter Hardy	Normal	Drilled	0.160
Traditional with Fall Nutrients	Rye	Normal	Drilled	0.290	Traditional with Fall Nutrients	Oats, Winter Hardy	Normal	Other	0.140
Traditional with Fall Nutrients	Rye	Normal	Other	0.250	Traditional with Fall Nutrients	Brassica	Early	Drilled	0.220
Traditional with Fall Nutrients	Rye	Late	Drilled	0.130	Traditional with Fall Nutrients	Brassica	Early	Other	0.190
Traditional with Fall Nutrients	Rye	Late	Other	0.110	Commodity	Rye	Early	Drilled	0.023
Traditional with Fall Nutrients	Wheat	Early	Drilled	0.220	Commodity	Rye	Early	Other	0.019
Traditional with Fall Nutrients	Wheat	Early	Other	0.190	Commodity	Rye	Early	Aerial	0.012
Traditional with Fall Nutrients	Wheat	Normal	Drilled	0.200	Commodity	Rye	Normal	Drilled	0.004
Traditional with Fall Nutrients	Wheat	Normal	Other	0.170	Commodity	Rye	Normal	Other	0.004
Traditional with Fall Nutrients	Wheat	Late	Drilled	0.090	Commodity	Rye	Late	Drilled	0.029
Traditional with Fall Nutrients	Wheat	Late	Other	0.080	Commodity	Rye	Late	Other	0.024
Traditional with Fall Nutrients	Barley	Early	Drilled	0.270	Commodity	Wheat	Early	Drilled	0.016
Traditional with Fall Nutrients	Barley	Early	Other	0.220	Commodity	Wheat	Early	Other	0.014
Traditional with Fall Nutrients	Barley	Normal	Drilled	0.200	Commodity	Wheat	Early	Aerial	0.009
Traditional with Fall Nutrients	Barley	Normal	Other	0.170	Commodity	Wheat	Normal	Drilled	0.003
Traditional with Fall Nutrients	Forage Radish Plus	Early	Drilled	0.200	Commodity	Wheat	Normal	Other	0.002
Traditional with Fall Nutrients	Forage Radish Plus	Early	Other	0.170	Commodity	Wheat	Late	Drilled	0.020
Traditional with Fall Nutrients	Forage Radish Plus	Normal	Drilled	0.150	Commodity	Wheat	Late	Other	0.017
Traditional with Fall Nutrients	Forage Radish Plus	Normal	Other	0.130	Commodity	Barley	Early	Drilled	0.019
Traditional with Fall Nutrients	Triticale	Early	Drilled	0.270	Commodity	Barley	Early	Other	0.016
Traditional with Fall Nutrients	Triticale	Early	Other	0.230	Commodity	Barley	Early	Aerial	0.011
Traditional with Fall Nutrients	Triticale	Normal	Drilled	0.250	Commodity	Barley	Normal	Drilled	0.003
Traditional with Fall Nutrients	Triticale	Normal	Other	0.210	Commodity	Barley	Normal	Other	0.002
Traditional with Fall Nutrients	Triticale	Late	Drilled	0.110	Commodity	Triticale	Early	Drilled	0.019
Traditional with Fall Nutrients	Triticale	Late	Other	0.100	Commodity	Triticale	Early	Other	0.016
Traditional with Fall Nutrients	Annual Ryegrass	Early	Drilled	0.210	Commodity	Triticale	Early	Aerial	0.013
Traditional with Fall Nutrients	Annual Ryegrass	Early	Other	0.180	Commodity	Triticale	Normal	Drilled	0.004
Traditional with Fall Nutrients	Annual Ryegrass	Normal	Drilled	0.190	Commodity	Triticale	Normal	Other	0.003
Traditional with Fall Nutrients	Annual Ryegrass	Normal	Other	0.160	Commodity	Triticale	Late	Drilled	0.024
Traditional with Fall Nutrients	Oats, Winter Hardy	Early	Drilled	0.170	Commodity	Triticale	Late	Other	0.021

X 2 for tillage and, again, X 2 for hydrogeomorphic region

Option B

Type	Species	Plant Date	Plant Method	TN Reduction
Traditional	Rye	Early/Normal	Drilled	0.43
Traditional	Rye	Early/Normal	Other/Aerial	0.33
Traditional	Rye	Late	Drilled	0.19
Traditional	Rye	Late	Other/Aerial	0.16
Traditional	Small Grains and Brassicas	Early/Normal	Drilled	0.33
Traditional	Small Grains and Brassicas	Early/Normal	Other/Aerial	0.25
Traditional	Small Grains and Brassicas	Late	Drilled	0.15
Traditional	Small Grains and Brassicas	Late	Other/Aerial	0.13
Traditional	Grasses, Oats, Radishes	Early/Normal	Drilled	0.24
Traditional	Grasses, Oats, Radishes	Early/Normal	Other/Aerial	0.18
Traditional	Annual Legume	Early/Normal	Drilled	0.07
Traditional	Annual Legume	Early/Normal	Other/Aerial	0.05
Traditional with Fall Nutrients	Rye	Early/Normal	Drilled	0.31
Traditional with Fall Nutrients	Rye	Early/Normal	Other/Aerial	0.26
Traditional with Fall Nutrients	Rye	Late	Drilled	0.13
Traditional with Fall Nutrients	Rye	Late	Other/Aerial	0.11
Traditional with Fall Nutrients	Small Grains and Brassicas	Early/Normal	Drilled	0.23
Traditional with Fall Nutrients	Small Grains and Brassicas	Early/Normal	Other/Aerial	0.20
Traditional with Fall Nutrients	Small Grains and Brassicas	Late	Drilled	0.10
Traditional with Fall Nutrients	Small Grains and Brassicas	Late	Other/Aerial	0.09
Traditional with Fall Nutrients	Grasses, Oats, Radishes	Early/Normal	Drilled	0.18
Traditional with Fall Nutrients	Grasses, Oats, Radishes	Early/Normal	Other/Aerial	0.16
Commodity	Rye	Early/Normal	Drilled	0.013
Commodity	Rye	Early/Normal	Other/Aerial	0.012
Commodity	Rye	Late	Drilled	0.029
Commodity	Rye	Late	Other/Aerial	0.024
Commodity	Small Grains	Early/Normal	Drilled	0.011
Commodity	Small Grains	Early/Normal	Other/Aerial	0.010
Commodity	Small Grains	Late	Drilled	0.022
Commodity	Small Grains	Late	Other/Aerial	0.019

X 2 for tillage and, again, X 2 for hydrogeomorphic region

Pros and Cons for Option B

- Pros:
  - Maintains largest differences in efficiencies between species, planting dates, and methods
    - Example: Traditional Rye, Early/Normal Drilled remains the gold standard with highest efficiency
  - Makes reporting easier by combining like species, planting dates and methods
    - Example: All small grains are now combined so states do not need to report wheat vs. barley vs. triticale
  - Makes online management tools, such as CAST, easier for managers to use.
    - Example: Users will choose from 12 traditional cover crops rather than 65
  - Differentiation in benefits among 400+ possible combinations hard to defend scientifically
  - If necessary, states can still submit more detailed information to NEIEN
- Cons:
  - Removes some differences in efficiencies between species, planting dates and methods recommended by panel
  - Discourages more specific reporting into the future
  - Limits partnership's ability to assess how many acres of specific species, such as barley, were planted in a given year