# 5th Annual Nitrogen: Minnesota’s Grand Challenge & Compelling Opportunity Conference

**Sessions 9:05 a.m.-3:40 p.m.**

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<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Presenters</th>
<th>Organizations</th>
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<tr>
<td>8:15 a.m.</td>
<td>Registration</td>
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<tr>
<td>9:00 a.m.</td>
<td>Welcome</td>
<td>Tom Rothman</td>
<td>University of Minnesota</td>
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<tr>
<td>9:05 a.m.</td>
<td>Lessons Learned in 2018, Opportunities for 2019</td>
<td>Brad Carlson, Dave Nicolai, Brandon Fast</td>
<td>University of Minnesota Extension, Minnesota Corn Research &amp; Promotion Council</td>
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<tr>
<td>9:55 a.m.</td>
<td>An Industry Perspective on Nitrogen: Beginning with 4R Nutrient Stewardship</td>
<td>Dr. Tai Maaz</td>
<td>International Plant Nutrition Institute</td>
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<td>10:50 a.m.</td>
<td>Break</td>
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<tr>
<td>11:05 a.m.</td>
<td>NUE and Potential Environmental Outcomes Associated with N Application Timing</td>
<td>Dr. Carrie Laboski</td>
<td>University of Wisconsin-Madison</td>
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<tr>
<td>12:00</td>
<td>Lunch</td>
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**Breakout Session #1**

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<tr>
<td>1:00 p.m.</td>
<td>Managing Corn for High Yield and Environmental Stewardship While Controlling Costs</td>
<td>Dr. Jeff Coulter</td>
<td>University of Minnesota</td>
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<tr>
<td>1:55 p.m.</td>
<td>N loss from Midwest cropping systems: What can we do about it?</td>
<td>Dr. Dan Jaynes</td>
<td>USDA ARS, Ames, IA</td>
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<tr>
<td>2:50 p.m.</td>
<td>Urea Fertilizer Do’s and Don’ts</td>
<td>Dr. Fabián Fernández</td>
<td>University of Minnesota</td>
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**Breakout Session #2**

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<tr>
<td>1:00 p.m.</td>
<td>Improving Nitrogen Mineralization Predictions</td>
<td>Dr. Jason Clark</td>
<td>South Dakota State University</td>
</tr>
<tr>
<td>1:55 p.m.</td>
<td>Soil Health and Implications for Nitrogen Management</td>
<td>Dr. Anna Cates</td>
<td>University of Minnesota</td>
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<tr>
<td>2:50 p.m.</td>
<td>Nitrogen Management with Manure</td>
<td>Dr. Melissa Wilson</td>
<td>University of Minnesota</td>
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<tr>
<td>3:40 p.m.</td>
<td>Adjourn</td>
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NUE and potential environmental outcomes associated with N application timing for corn


Nitrogen: Minnesota’s Grand Challenge and Compelling Opportunity Conference
February 5, 2019
Research Sites

- 49 site-years
- Site selection
  - Site productivity
  - Prev. crop soybean, except for 5 corn, 1 sunflower
  - No recent manure history
  - Tillage: no-till and reduced
- Standardized protocol
- Treatments
  - 0-280 lb N/a
    - At plant
    - Split = 40 lb N/a at plant + V9 sidedress

Research funded by Pioneer
Very brief summary of soil characteristics

Natural drainage class ranged from poorly to excessively drained
Yield Response to N and EONR

Study average: Profitability within $1/a of EONR = EONR \pm 9 \text{ lb N/a}
How does N application timing effect RSN?
At N rates \( \geq \) EONR, split applications leave more N in the soil profile after harvest.

At EONR, estimated RSN was 18 lb N/a greater for split application (55 vs 37 lb N/a).

PPNT background = 50 lb/a
No difference in biomass N uptake at EONR

At EONR, no difference in est. N uptake between N application timings

Therefore, it is not if N is being lost, but rather when
How high does N application have to be before RSN starts to increase substantially?
If N rate is >27 lb N/a over EONR, then RSN is significantly greater than under application.
How does N timing effect N use efficiency?

Agronomic Efficiency = \frac{\text{Increase in grain yield over 0 N rate}}{\text{N Application Rate}}
Timing does not effect NUE at the EONR
NUE highly variable

- 100% of AE ≥ 52 lb grain per lb N, under applied
- 90% of AE ≤ 15 lb grain per lb N, over applied
How does N timing influence profitability?
Split application has slightly lower EONR

- Study average EONR:
  - AP: 151 lb N/a
  - Split: 142 lb N/a

- Differences > 18 lb N/a in EONR:
  - \( \text{EONR}_{\text{AP}} > \text{EONR}_{\text{split}} \) (n=19)
  - \( \text{EONR}_{\text{AP}} < \text{EONR}_{\text{split}} \) (n=11)
  - \( \text{EONR}_{\text{AP}} = \text{EONR}_{\text{split}} \) (n=19)
Profitability of N timing is based on soil/site conditions

- Study average return to N:
  - AP: $323/a
  - Split: $343/a

- Differences >$10/a in return to N at EONR:
  - AP > Split (n=16)
  - AP < Split (n=18)
  - AP = Split (n=10)
Take Home Points

• Split applications do not necessarily result in less potential N loss
  • Time of application influences *when* N loss may occur

• Profitable production resulted in low potential for N loss, regardless of application timing
  • Split applications may be more profitable on poorly drained and excessively drained soils
  • At plant applications were more profitable on tile drained soils

• NUE can vary substantially at the EONR
  • NUE may be useful to compare management practices in a field, but should not be used to target a value that would be considered a nutrient management success

• Continued efforts to refine N rate decision making tools and increase grower adoption are necessary to improve water quality
  • N management tools should be considered successful if they limit over application by ~25 lb N/a
Thank you!

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http://ipcm.wisc.edu/
https://youtube.com/user/uwipm