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Nitrogen Sensing and Impact on C, N, and H_2O

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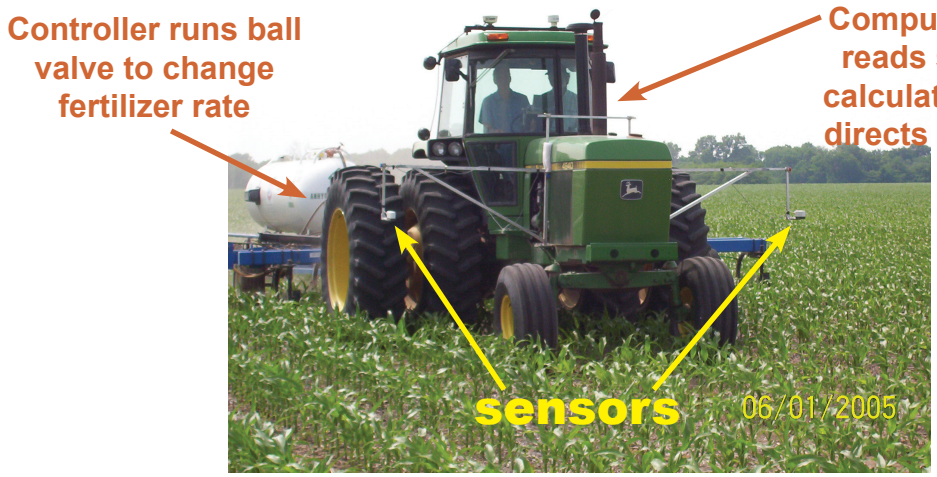
Nitrogen (N) management in corn has a large impact on resilience of corn production to changing climate and on the greenhouse gas footprint of corn production. During wet springs, as were seen across large swaths of the Midwest in 2008, 2009, 2010, and 2011, vast quantities of N fertilizer applied before planting are lost and corn yield suffers. I estimate 2 billion bushels of lost yield potential during these four years. Applying N fertilizer during the growing season could have recovered most of this lost yield.

This lost production also represents lost potential to capture carbon from the atmosphere. In addition, conditions were perfect for large losses of the greenhouse gas nitrous oxide. Finally, nitrogen fertilizer production releases a large amount of carbon dioxide to the air. Maximizing efficiency and minimizing loss of N fertilizer will reduce the greenhouse gas footprint of corn production via all three of these mechanisms.

Optimal nitrogen fertilizer rate has been shown to vary widely from year to year, from field to field, and from place to place within a field. Canopy reflectance measurements are a promising approach to diagnose and treat this variation in real time while applying N fertilizer. Relative to existing N management systems, this approach has potential to increase or maintain yield, increase or maintain carbon capture, reduce nitrous oxide production, and reduce carbon dioxide release associated with N fertilizer manufacture.

Aerial photographs of the Missouri landscape identifies areas of significant nitrogen deficiency in the corn crop.

Variable-rate N sidedressing guided by corn sensors



References

- "Crop Sensors Outdo Farmers at Choosing Nitrogen Rates," online at http://thatssoundadvice.com/crop-sensors-outdo-farmers-at-choosing-nitrogen-rates/.
- The Heartland Initiative (2006) "Nitrogen Management for Water Quality Protection in the Midwest," online at https://www.certifiedcropadviser.org/story/2011/nov/tue/crop-sensors-outdo-farmers-at-choosing-nitrogen-rates-0.
- Scharf, Peter C. (2005) "Managing Nitrogen with Crop Sensors: Why and How," online at http://plantsci.missouri.edu/nutrientmanagement/nitrogen/sensor%20manual.pdf.

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