Supplemental Late-vegetative N Applications for High-yield Corn: Agronomic, Economic, and Environmental Implications with Modern versus Older Hybrids

Performance comparison of old versus new corn hybrids

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Project dates: Spring 2014 – March 2017

Project Number: 4RN-25

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Research Fund

PROJECT GOALS

SOURCE	All urea ammonium nitrate
RATE	Different rates of total N applications from 0 to 240 pounds N/acre
TIME	Comparing N applied at standard side dressing time and a split side dress with a pre-tassel N application
PLACE	All sidedress fertilizer banded with injection, late-split N banded on soil surface or injected into soil in bands between the corn rows.

PROJECT RESULTS

Modern hybrids continue to accumulate N later in the growing season.

SOURCE	Same source
RATE	Experiments in progress, N recovery efficiency by corn improves at the lower total N rates that are more feasible with a late-split N approach.
TIME	Review of the literature indicates that New Era hybrids look to benefit more from later season applications of N as more of the N in the grain is taken up during the post silking growth stage; fertilizer N recovery is higher when the same total N rate was applied with both side-dress and late-split timings.
PLACE	Late-split N was available to plants whether injected or surface applied when rainfall was not limiting.

WHAT DO WE DO NEXT?

- Evaluate the results of the field studies underway and determine new fertilizer timing recommendations. Study hybrid era impacts on corn's ability to recover from mid-season N deficiency.
- If funding is available, examine how changes in timing of N application(s) may change N loss to water and air.
- Relate the nitrous oxide losses during the growing season with different N timings and rates to the whole-plant N recovery during the growing season.

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MEET TONY

Tony has always been interested in testing and identifying cropping systems that increase nutrient efficiency and limit nutrient losses to the environment. He finds it a challenge to simultaneously improve farmer profitability and nutrient stewardship, but making continued advances in the context of modern corn hybrids and new technologies offers hope to reduce our N2O footprint per unit of crop production.

He also enjoys training graduate students and the next generation of crop and plant nutrition scientists.

"My parents immigrated to Canada from the Netherlands and bought a farm after working for other Canadian farmers for 10 years. Most of my youth was spent on a hog and cash crop farm near Ridgetown, Ontario, Canada. My wife and I were blessed with four children, and one of them farms in Texas. I am grateful to my parents and mentoring professors for encouraging me to continue my education."

Tony's research portfolio includes no-till and strip-till with alternate phosphorus and potassium placements for corn, as well as trying to understand the mechanisms for corn hybrid improvements in nitrogen use efficiency over time. "Financial support from the fertilizer, seed, and equipment industries over the years has helped to fund this cropping systems research. It has been rewarding to mentor many graduate students in crop and nutrient management at both Purdue University, and previously at the University of Guelph."

PUBLISHED REPORTS

Mueller, S.M, and T.J. Vyn. 2016. Maize plant resilience to N stress and post-silking N capacity changes over time: A review. Frontiers Plant Sci. 7:1-14. http://dx.doi.org/10.3389/fpls.2016.00053.

van Hoose, N. 2016. Modern corn hybrids more resilient to nitrogen stress, crowded planting conditions. Purdue Agricultural News. Mar. 7, 2016. Available at http://www.purdue.edu/newsroom/releases/2016/Q1/modern-corn-hybrids-more-resilient-to-nitrogen-stress,-crowded-planting-conditions.html (verified 15 Aug. 2016).