



CORN MARKETING PROGRAM
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Research Report**

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Integrating 4R Nutrient Management and Soil Health to Optimize Michigan Corn Production

Increased variability in spring and summer weather, volatile pricing, and continued protection of the great lakes and ground-water quality all continue to emphasize improved nitrogen (N) management strategies in relation to corn N response.

In an attempt to address economic, social, and environmental concerns over nutrient management, the world fertilizer industry has adopted 4R Nutrient Stewardship. This concept emphasizes applying the right source of N, at the right rate, at the right time, and in the right place. This project investigates how to best accomplish this in Michigan.

Although N fertilizer recommendations are a straightforward calculation based on crop demand minus N contributions from soil, N placement and timing are key factors in more closely synchronizing N availability with peak corn N demand. The greatest potential for N loss occurs during wet, warm conditions, and when soil nitrate is present without active crop growth.

Applying N closer to the time of corn N uptake minimizes these two factors and improves efficiency from both a yield and environmental risk perspective. With advances in application technology including pre-tassel coulter N injection, there is a need to identify corn response and efficiency to new N fertilization strategies that demonstrate Michigan corn producers/commitment to both economic returns and environmental stewardship.

This project has established corn field plots in Lansing and Richville Michigan. They compared pop-up, sidedress injected and pre-tassel nitrogen timings in various combinations. Products utilized included UAN mixed with Agrotain® Ultra (urease inhibitor) to prevent N volatilization. Herbrucks dried poultry litter was used as an organic N source while Environmentally Smart Nitrogen (ESN®) was used as the PCU n source.

Synchronizing N application timing with plant N uptake may increase efficiency of N use by reducing the number of opportunities for N loss. However in 2014, a lack of numerous, large (> 1 inch) precipitation events may have assisted in preventing excessive N loss during the early growing season thus improving the effectiveness of early N applications and reducing the corn response to late N application timing. Late N applications reduced yield when pop-up or 2x2 strategies were utilized in combination with sidedress N applied at growth stage V10-11.

Although late-season N application as a standard practice reduced yield in 2014, data do show that growers missing the opportunity to apply PPI or early-season sidedress N may still benefit from a late season N application as yields in excess of >212 bu/A and >215 bu/A were obtained at the Lansing and Richville sites, respectively. Growers utilizing a single PPI N application may have benefited from this strategy in 2014 but soil moisture and air temperature patterns encountered this growing season were atypical for a Michigan growing season. This project is being replicated again in 2015, and with an obvious potential to encounter a different rain patter during the growing season.

[Click here](#) to access the full research report for this project.