

QUANTIFYING RISK IN NITROGEN MANAGEMENT THROUGH ON-FARM EVALUATIONS

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Abstract

The process of nitrogen (N) management in corn (*Zea mays* L.) production is often reduced to finding ways to manage various risks. These risks include common difficulties of quantifying soil N availability, avoiding N fertilizer losses, and predicting the impact of weather before and after fertilizer applications.

This poster provides a synopsis of several recent on-farm evaluation studies conducted across Iowa. These studies were designed and executed to identify management, soil, and weather factors that impact N availability and corn N status. Specifically, these studies provided insights related to 1) the risk of economic yield loss when farmers apply approximately 30% less than their normal N fertilizer rates, 2) the risk of N deficiencies in some areas within fields in years when rainfall amounts are either excessive, resulting in N loss, or too little, resulting in reduced N uptake by corn plants, and 3) the effects of a large variation in grain and N fertilizer prices on the ability of the corn stalk nitrate test to correctly identify corn N status.

For these on-farm evaluations, farmers used precision agriculture technologies to conduct replicated field-scale trials with different N rates, forms, and application timing. Late season corn N status was evaluated by analyzing yield response observations and using corn stalk nitrate samples that had been collected based on aerial imagery of the corn canopy.

Results of these on-farm studies helped to develop a decision management tree that specifies when and where farmers can reduce their normal N application rates and further indicate the relative risk of N loss for different N management categories, which are based on combinations of timing and N forms commonly used by farmers in Iowa.

These on-farm approaches for quantifying various risks in N management should help develop better N management decision systems that can achieve the water nitrate objectives set by the Iowa Nutrient Reduction Strategy.

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