

Strategies for Meeting N Requirements of Wheat with New Fertilizer and Fertilizer Additives

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Research Questions

What is the value of nitrogen stabilizing technologies on nitrogen efficiency when applied in the fall?

What amount of ESN can safely be placed with spring wheat seed at the time of planting?

Results

Experiments were conducted in three locations. At the Prosper site, the fall application treatments were lost so we basically have two locations with the full set of treatments. The two locations in MN varied significantly in their overall yield and protein with Red Lake Falls averaging 54.8 bu/a and 13.9% protein and Argyle averaging 97.6 bu/a and 12.1% protein. Averaged over the two sites, when 100% fall applied ESN was compared to 100% fall applied urea, yields were only slightly greater but the protein content of the grain was a 1.5% higher. Of the treatments with 100% the N at Argyle (the highest yielding site), the highest yield was obtained with 100% ESN applied with the seed in the spring. Proteins with spring applied treatments were slightly higher than will fall applied treatments. Spring applied Instinct did not improved yield or protein compared to urea alone but with applications it appeared to improve protein. The data also suggests that it is relatively safe to place ESN with seed up to 90 lbs N. Urea can be damaging to plant stands at about 50 lbs N, though in some cases higher rates could be used safely. Additional research is needed to verify the potential value of these N stabilizers on spring wheat yield and protein.

Application/Use

These results are preliminary. Therefore, we are not comfortable in recommending any of the treatments including in the research. N extenders in the environments where this research was conducted probably did not improve yield and protein enough to cover their cost, at least not consistently. Therefore, additional focused research on key treatments in the future, should provide a way forward in developing an useful recommendation. Applying ESN in the fall looks promising and may be an option that would be attractive to growers. The research proposed for 2015 will focus on this and will broaden the soil types where the research is conducted. Perhaps one recommendation that could be made at this point is that if a grower wishes to apply some of his fertilizer with his seed at planting, using ESN would be a safe way to deliver this fertilizer.

Material and Methods

Experiments were established in three locations: Red Lake Falls, Argyle and Prosper. These experiments were replicated four times. The following treatments were included (90 lb was the 100% rate):

0-Check

50% Optimal N Rate-100% ESN

50% Optimal N Rate-75:25 ESN:urea

50% Optimal N Rate-50:50 ESN:urea

75% Optimal N Rate-100% ESN

75% Optimal N Rate-75:25 ESN:urea

75% Optimal N Rate-50:50 ESN:urea

100% Optimal N Rate-100% ESN

100% Optimal N Rate-75:25 ESN:urea

100% Optimal N Rate-50:50 ESN:urea

125% Optimal N Rate-100% ESN

125% Optimal N Rate-75:25 ESN:urea

125% Optimal N Rate-50:50 ESN:urea

FALL-100% Optimal N Rate Broadcast-100% ESN

FALL-100% Optimal N Rate Broadcast-100% Urea

SPRING- 50% ESN : 50% Urea Broadcast Late Pre or at seeding

SPRING-100% Optimal N Rate Broadcast-100% Urea

SPRING-50% Urea:50% UAN at 4 leaf stage

SPRING-100% Optimal N Rate Broadcast-100% Instinct

FALL-100% Optimal N Rate Broadcast-50:50 ESN:Urea

FALL-100% Optimal N Rate Broadcast-75:25 ESN:Urea

FALL-100% Optimal N Rate Broadcast-100% Instinct

FALL-50% Optimal N Rate Broadcast-100% ESN

FALL-50% Optimal N Rate Broadcast-100% Urea

Yield, test weight, and protein were measure at harvest.

Economic Benefit to a Typical 500 Acre Wheat Enterprise

Since these results are preliminary, we are not prepared to estimate an economic benefit.

Recommended Future Research

We propose to focus on fall applications of ESN in our future research. It would also be interesting to look at an increased rate of Instinct.