THE EFFECT OF SLOW-RELEASE N FERTILIZER RATE AND TIMING ON WHEAT GRAIN YIELD COMPARED TO OTHER N SOURCES

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Management strategies to reduce soil N loss include improved timing of N fertilizer applications, better use of soil and plant testing procedures to determine N availability, application of nitrification or urease inhibitors, and use of N fertilizer sources that are suitable for local environmental conditions (Dinnes et al., 2002). Use of slow-release urea fertilizer sources is a common strategy to reduce N leaching losses in horticultural crops, but its agronomic performance and cost-effectiveness f has not been well established. Recent research at over 42 research sites in the Midwest indicated that average corn yield response to polymer-coated urea was 5 bu/acre higher compared to conventional urea or UAN solution, especially during years of normal or high rainfall (Blaylock, 2003). Use of slow-release N fertilizer for wheat may be a cost-effective management practice to improve crop performance and possibly allow custom applicators to apply a single fertilizer application in the fall for wheat. The extra cost of this N source (approx. 10¢ more per lb urea N) must be evaluated relative to its potential benefits under field conditions in Missouri due to the wet fall and spring conditions commonly encountered by Missouri farmers. Limited research has examined the agronomic performance of wheat in response to polymer-coated urea. The objective of this research was to 1) determine the impact of polymer-coated urea rates and application timings on wheat and frost seeded clover forage yields and 2) evaluate the cost-effectiveness of polymer-coated urea compared with other commonly used nitrogen sources for wheat production in Northern Missouri.

Research was conducted at the Greenley Research Center near Novelty, MO in 2004. This research was arranged as a randomized complete block design with four replications in plots 10 by 45 ft. 'Ernie' was no-till drilled on October 23, 2003 at 150 lbs/acre in 7.5 in. wide rows. N fertilizer rates were applied at fall and split-application timings (Table 1). Fall N treatments were applied on November 1, 2003 and the spring N treatment was applied March 19, 2004. Red clover was also frost-seeded to the entire plot area on March 19, 2004 to simulate a broadcast application of dry fertilizer and clover seed. Wheat fresh weights were measured at physiological maturity (data not presented) and plots harvested with a small-plot combine. Grain moisture was adjusted to 13% prior to analysis. All data were subjected to analysis of variance and means separated using Fisher's Protected LSD (P=0.05).

Wheat grain yield was similar among nitrogen source application rates and timings in 2003. Wheat treated with fall applied ESN at 50 lb N/acre had grain yields 6 and 4 bu/a greater than 28% urea ammonium nitrate at 50 lb N/acre and ammonium nitrate at 50 lb N/acre, respectively. There was no effect of Agrotain on wheat grain yields when compared to urea applied alone in 2004. This research will be repeated in 2005.

References:

Blaylock, A. 2003. Controlled release fertilizer: Research summary 2000-2002. Agrium U.S. Inc. Denver, CO.

Dinnes, D.L., D.L. Karlen, D.B. Janes, T.C. Kaspar, J.L. Hatfield, T.S. Colvin, and C.A. Cambardella. 2002. Nitrogen management strategies to reduce nitrate leaching in tile-drained Midwestern soils. Agron. J. 94:153-171.

Table 1. The effect of N fertilizer source, rate, and application timing on no-till wheat grain yield[a].

	Fall applied				Split-applied	
Nitrogen source	0 lb N/acre	50 lb N/acre	75 lb N/acre	100 lb N/acre	25 fb 50 lb N/acre	50 fb 50 lb N/acre
	Yield (bu/acre)					
Untreated	41					
ESN		48	45	47	45	45
Urea		46	47	47	46	47
Urea + Agrotain (1 gal/ton)		45	43	44	44	44
32% urea ammonium nirate		42	45	43	44	45
Ammonium nitrate		44	47	46	47	45
LSD (p=0.05)	4					

[a]Abbreviations: 25 fb 50, 25 lbs N/acre fall applied followed by 50 lbs N/acre spring applied; 50 fb 50, 50 lbs N/acre fall applied followed by 50 lbs N/acre spring applied; ESN, polymer-coated urea.

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