

SEED BANDED NITROGEN FOR WINTER WHEAT

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ABSTRACT

Field studies were conducted in two years at the University of Idaho, Parma R&E Center to compare a polymer coated urea (ESN[®]) to conventional urea for seed-banding with optimal early (mid October) or late planted (mid November) winter wheat. Treatments included an untreated control, and both fertilizers at four nitrogen (N) rates (20, 40, 60, and 80 lb N/A) seed-banded through double disk openers and balanced with pre-plant broadcast urea to provide a total of 80 lb of applied N/A. ESN[®] was considerably safer than urea when seed-banded. Stands were reduced with as little as 20 lb seed-banded urea N/A. Emergence was invariably delayed with urea but final stands at the lower N rates were not always reduced. Delayed emergence with seed-banded urea reduced yield even when final stands did not differ from the control. Yield with seed-banded ESN[®] was not affected even with the highest N rate of 80 lb N/A.

INTRODUCTION

Due to security concerns, fewer major suppliers will manufacture ammonium nitrate (AN) fertilizer. Ammonium nitrate, with only half the ammoniac N content of ammonium sulfate or urea, was historically a favored seed banded N source for wheat due to its reduced potential for seed damage or phytotoxicity. Higher N rates could be seed-banded using AN so it facilitated single pass seeding and fertilization, especially in dryland systems where the amount of N needed was relatively low anyway. Seed-banded N at seeding effectively reduced field traffic in wetter soils and fuel expenses. In addition, preplant incorporated N helped distribute the workload in addition to minimizing volatile N losses from the soil surface.

There is need for N fertilizer that can be applied with the seed without the limitations of conventional dry N sources (immobilization; rapid nitrification and subsequent leaching or denitrification; phytotoxicity). Older slow release N sources were shown to reduce phytotoxicity on gB1). wmiryy

METHODS

To compare a polymer coated urea, ESN[®] (Agrium), with conventional urea when seed-banded with winter wheat, Idaho Wheat Commission sponsored field studies were conducted at the Parma R & E Center in 2008 and 2009. Treatments included an untreated control, and both fertilizers at four N rates (20, 40, 60, and 80 lb N/A) seed-banded through double disk openers in 7" spaced rows. All seed banded N rates were balanced with preplant broadcast urea N to provide a total of 80 lb N/A. Treatments were evaluated in both October (October 10, 2007 and October 21, 2008) and late (November 5, 2007 and November 21, 2008) plantings of Stephens soft white winter wheat in separate trials. Plots were seven rows wide on five foot beds, 25 feet long, and irrigated with furrows spaced between plots. Irrigation sets were of sufficient duration to wet to the centers of the five foot beds.

Stand count

Using the same seed-banded fertilizer N rates per acre with wider row spacings (10" or 14") would concentrate the fertilizer in fewer rows, and increase the phytotoxicity of seed-banded N. Consequently, with wider row spacings, lower seed-banded N rates will be required to avoid affects on germinating wheat. Other slow release N sources may also reduce the impact of seed banded N on wheat, but were not evaluated in these trials.

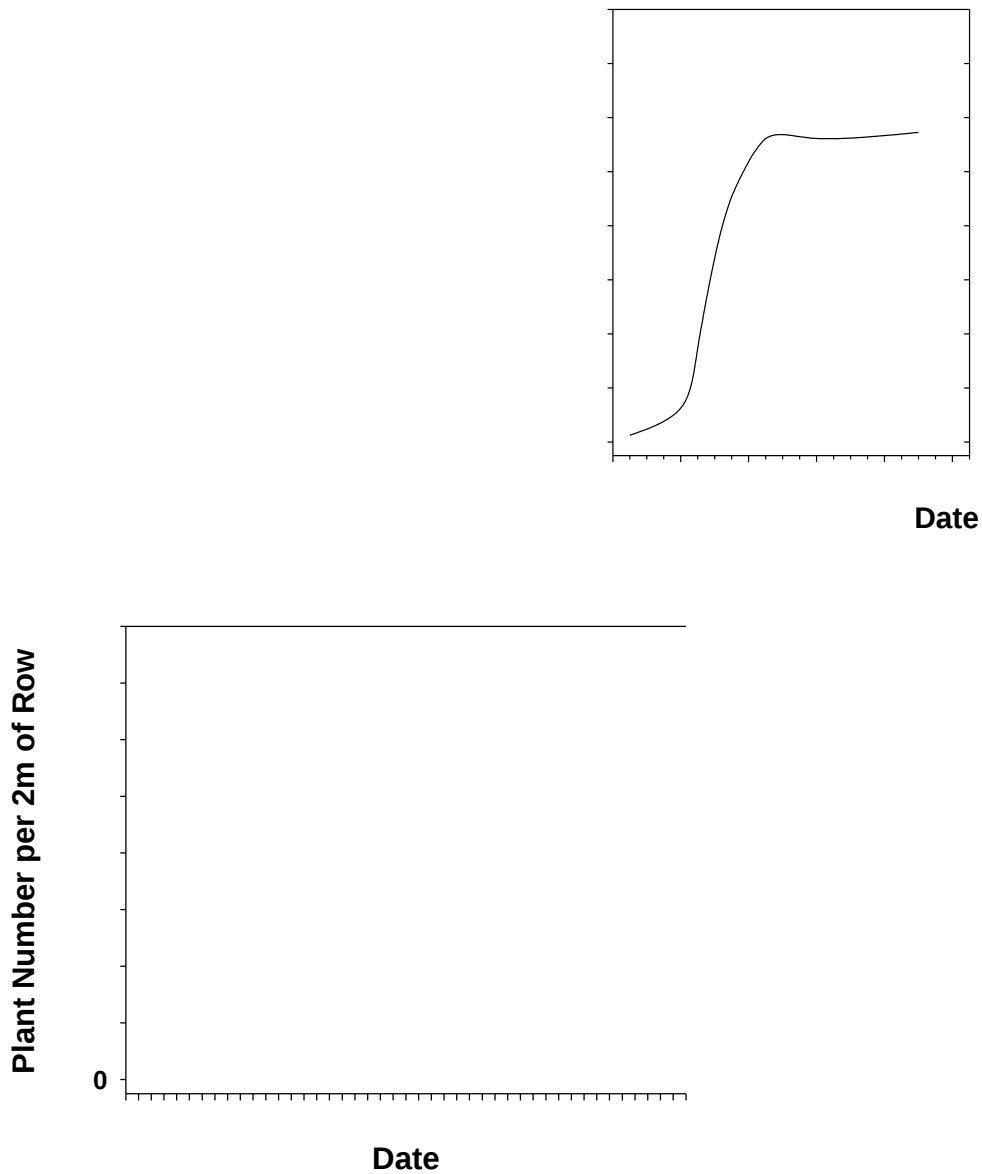


Figure 2. Early and late planted winter wheat plant counts as affected by seed banded N at Parma in fall 2008 and late winter 2009.

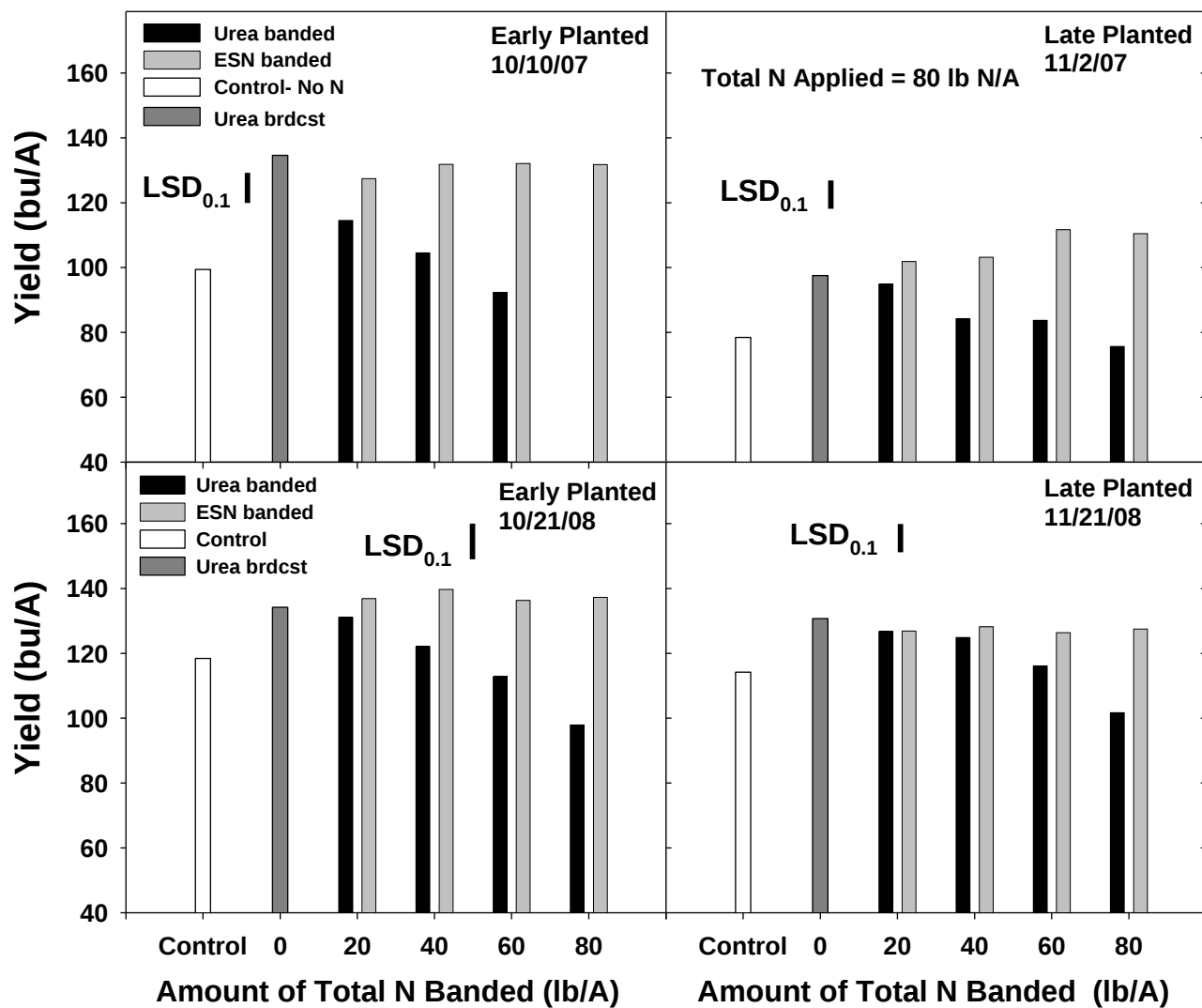


Figure 3. Early and late planted winter wheat yield as affected by N rates of seed banded conventional urea or slow release ESN N in the 2008 and 2009 seasons. There was no yield with the 80 lb urea N seed banded for the earlier planted wheat in 2008.

REFERENCES

- Mahler, R. L., L. K. Lutcher, and D. O. Everson. 1989. Evaluation of factors affecting emergence of winter wheat planted with seed-banded nitrogen fertilizers.
- Severson, G. R., and R. L. Mahler. 1988. Influence of soil water potential and seed-banded sulfur-coated urea on spring barley emergence. *Soil Sci. Soc. Amer. J.* 52:529-534.

Table 1. Plant height of winter wheat in the outer row, next to the furrow, as affected by N source and rate.

Planting Date	N Source	Seed-banded N Rate (lb N/A)			
		20	40	60	80
Nov 2007	ESN	34.9	35.0	34.9	35.1
	Urea	33.5	32.8	32.3	30.6
		LSD _{.05} =0.9			
Oct 2008	ESN	36.7	37.1	36.9	36.7
	Urea	36.4	36.0	35.6	33.9
		LSD _{.05} =2.1			