

W004 – Enhanced efficiency fertilizer effects on yield and protein of CPSR wheat

Introduction

Partnering with Luke Adam of Rolling Acres Farm (near Stony Plain, AB), this protocol compared application of two urea:ESN nitrogen fertilizer blends with urea. All treatments were applied at the time of seeding on the CPSR variety AAC Penhold. The trial was seeded using a 32-foot, double shoot Flexicoil 820 drill with 2320 cart, and Dutch openers on 7.5" row spacings. Treatments were replicated and randomized.

Protocol #: W004

Closest Town: Stony Plain, Alberta

Soil type: Medium textured Dark Gray Luvisol

Seeding Date: May 15, 2021

Harvest Date: September 9, 2021

Row Spacing(cm): 19.05 cm (7.5")

Variety(s): AAC Penhold

Reps: 6

Previous Crop: Canola

Tillage: Zero till

Herbicides:

Pre: Priority and RoundUp

In-Crop: Tundra + AMS

Seed Treatment: Raxil Pro

Foliar Insecticides: None

Foliar Fungicides: None

Fertilizer:

Total fertilizer applied: 95 lbs actual N/ac; 5.8 lbs P₂O₅/ac; 5.8 lbs K₂O/ac; 4.9 lbs S/ac; 0.8 lbs C/ac; 0.8 lbs B/ac

Seed Placed: 8-18-18-5 @32 lbs/ac

Irrigation: None

Rainfall: Between May 1 and August 30: 121.8 mm (4.8")

September 1-2: 44 mm (1.7")

Treatments

Treatment 1: 100% of total required nitrogen as urea applied at time of seeding

Treatment 2: Total nitrogen required applied as 25% ESN + 75% urea at time of seeding

Treatment 3: Total nitrogen required applied as 50% ESN + 50% urea at time of seeding

Goal:

To determine the yield and grain quality impacts of increasing ratios of ESN as a percentage of the total nitrogen applied, at time of seeding in spring wheat production.

Plant stand count and tiller number results:

The rates of ESN did not cause any significant differences in plant stand counts or tiller number between treatments (Table 1).

Yield results:

Treatments did not have an effect on final yield (Table 1).

Grain quality results:

Treatments did not have an effect on grain protein, test weight, or fusarium infection.

Table 1: Plant stand counts, tiller number, yield, and quality results comparing two ratios of ESN:urea with straight urea (100% of total required nitrogen as urea applied at time of seeding, total nitrogen required applied as 25% ESN + 75% urea at time of seeding and total nitrogen required applied as 50% ESN + 50% urea at time of seeding) on AAC Penhold in Stony Plain, Alberta, 2021.

Starter fertilizer ratio between ESN and urea	Plant stand count at 21 days after seeding (plants/ft ²)	Yield at 14.5% seed moisture content (bu/ac)	Number of tillers per plant	Protein %	Test Weight (kg/hL)	Fusarium %
100% urea	28 a	29.4 a	1.3 a	15.4 a	79.6 a	0.10 a
50% ESN/50% urea	27.1 a	27.4 a	1.3 a	15.3 a	79.7 a	0.10 a
75% urea/25% ESN	27.8 a	27.3 a	1.3 a	15.4 a	79.6 a	0.10 a
<i>p-value</i>	<i>0.8146</i>	<i>0.4133</i>	<i>0.9508</i>	<i>0.7997</i>	<i>0.5064</i>	<i>0.2811</i>
CV%	8.47%	37.45%	9.99%	1.49%	0.55%	13.17%

Values with the same letter are not significantly different. Significant difference if $p \leq 0.05$.

Results Summary

A lack of moisture was the largest factor limiting growth. The yields were half of typical for the area. Soil test recommendations were based on a yield target of 60 bu/ac, since less than 30 bu/ac were harvested, nutrients were not a limiting growth factor in this trial. There were no statistical differences between the urea:ESN treatments for plant stand, number of tillers per plant, yield, protein, test weight or fusarium.