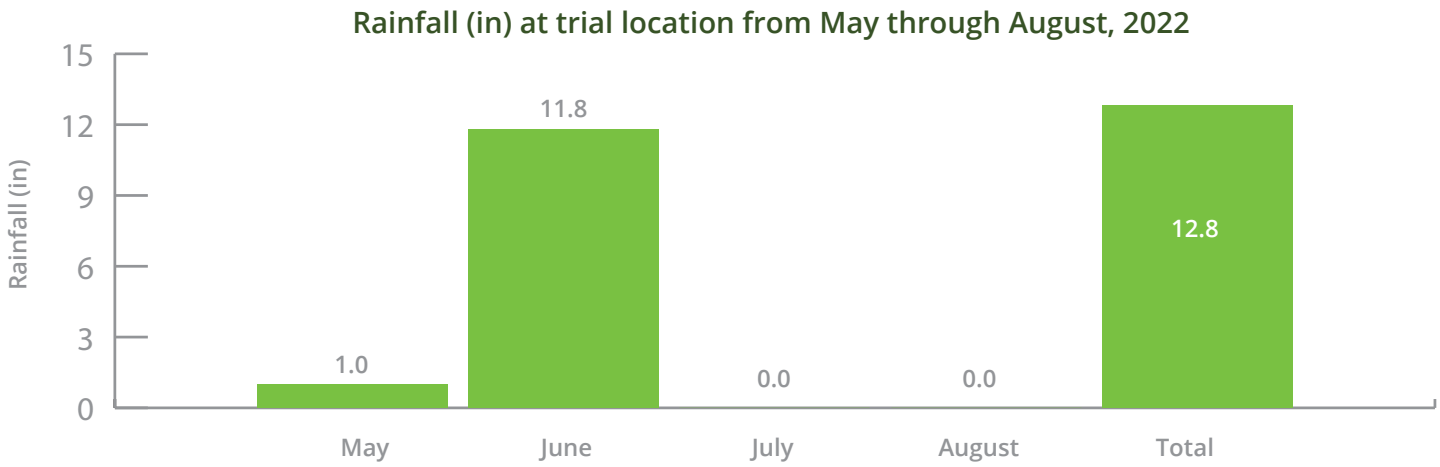
Split nitrogen application in spring wheat (Kneehill)

This trial was conducted with the agronomic support of Centrefield Solutions

Closest Town: Three Hills, Alberta
Soil type: Orthic Dark Brown Chernozem on medium textured till
Seeding Date: April 30, 2022
Harvest Date: September 3 2022
Row Spacing(cm): 10" (25.5 cm)
Variety(s): CDC Go
Reps: Four
Previous Crop: Yellow Peas
Tillage: None

Herbicides: Pre: None
In-Crop: Axial + Buctril M
Seed Treatment: Raxil Pro
Foliar Insecticides: None
Foliar Fungicides: Prosaro XTR
Fertilizer: 140N-40P-0-0 actual nutrient/ac (this field also receives 300lbs/ac of Biosul every 3 years)
Irrigation: None

Rainfall:



Introduction

Partnering with Sage Creek Farms in Three Hills, Alberta, this trial compared split nitrogen application to all nitrogen banded at seeding on the CWRS variety CDC Go. The trial was seeded using a Bourgault seeding with 10" (25.5 cm) row spacings and 2" openers. Nitrogen applied at seeding was applied as urea in a side-band. In-crop nitrogen was applied as UAN (28%) using a 120ft sprayer and streamer bars. Half water half UAN and doubled volume. Treatments were replicated and randomized.
As indicated from soil tests, soil nitrogen (NO_{-3}) at 0-12" depth was 23 lbs ac^{-1}. Field organic matter and pH in the top 6" was 5.1% and 5.8%, respectively.

Treatments

Trial design goal:
To determine the yield and grain quality impacts of split nitrogen application on spring wheat production.

Treatment 1: All nitrogen at time of seeding (140 lbs of N/ac)

Treatment 2:
57% (80 lbs N/ac) of nitrogen at time of seeding followed by
21% (30 lbs of N/ac) at beginning of stem elongation followed by
21% (30 lbs of N/ac) at end of booting stage

Results

In-crop assessment results

Plant stand assessments were conducted 21 days after seeding to potential differences in plant stand due to treatments. Treatments had no effect on the plant stand.

Yield results

No significant differences in yield were seen between any treatments (Table 1).

Table 1: Yield, and quality results comparing split nitrogen application on the Canada Western Red Spring (CWRS) spring wheat variety CDC Go in Three Hills, Alberta, 2022.

Treatment	Plant stand count at 21 days after seeding (plants/ft^2)	Yield at 14.5% seed moisture content (bu/ac)	Protein (%)	Test Weight (lbs/bu)
Nitrogen at seeding	47.1 a	90.5 a	**13.8 b**	65.88 a
Split application	46.1 a	90.4 a	**14.3 a**	65.72 a
***p*-value**	*0.4453*	*0.9717*	*0.0006*	*0.4228*
CV%	5.66%	4.07%	3.46%	0.21%

Values with the same letter are not significantly different. Significant difference if p≤0.05.

Grain quality results

The split nitrogen application treatment led to a significant increase in grain protein of 0.5%.

Economics

Considering no yield difference between treatments and a 0.5% protein increase, increased economics through split nitrogen application would depend on potential value of additional protein. As of November 2022, the additional 0.5% protein under split nitrogen application would provide an additional $0.01 per bushel. Assuming equal cost of nitrogen source, and a modest application cost of $7.00 per acre, the split nitrogen treatment is the least economic approach to nitrogen fertilizer application.

Summary

Split nitrogen application did not provide yield benefit. However, a 0.5% increase in grain protein was seen. Economically, the treatment of applying all nitrogen at the time of seeding was best. However, results indicate that a split nitrogen application did not cause a decrease in yield. Therefore, split nitrogen application can be a tactic utilized in scenarios where confidence in yield targets is limited due to spring available moisture. Producers may apply less nitrogen at seeding to mitigate risk and decide to apply more nitrogen in-season if environmental conditions are conducive for yield gain.