Factsheet: Demonstrating 4R Nitrogen Principles in Canola

Objective:

The objective of this trial is to demonstrate canola response to varying rates of N along with different combinations of formulations, timing and placement methods relative to side-banded, untreated urea as a control. The proposed field trial design encompasses all four considerations (rate, form, placement and timing) for 4R nutrient management.

Methodology:

The demonstration was arranged as a randomized complete block design with four replicates at Scott 2017. The treatments consisted of fertilizer N rate, fertilizer placement and product to result in a total of ten treatments (Table 1). Prior to seeding, soil samples were collected at two depth increments (0-15 cm and 15-60 cm) in order to determine fertilizer rates recommendations (Table A1). The trial was sown on wheat stubble using an R-tech drill with 10-inch row spacing. The canola variety was Liberty Link 140P and was seeded at 115 seeds/m^2. Weeds and disease were controlled using registered herbicide and foliar fungicide applications.

Table 1. Treatment list representing treatment numbers, variety and seeding date.

Trt #	Rate of Nitrogen	Fertilizer Placement	Products
1	0	-	-
2	0.5x[Z]	Side Band	Urea
3	1.0x	Side Band	Urea
4	1.5x	Side Band	Urea
5	1.0x	Pre-Seed Broadcast	Urea
6	1.0x	Pre-Seed Broadcast	Agrotain
7	1.0x	Pre-Seed Broadcast	Super U
8	1.0x[Y]	Split Broadcast	Urea
9	1.0x	Split Broadcast	Agrotain
10	1.0x	Split Broadcast	Super U

[Z]1x =Based on soil test recommendations.

[Y] Split application with 50% of total N side-banded during seeding and remainder applied as per protocol approximately 4 weeks after planting (4-6 leaf stage).

Key Findings:

- NDVI had a positive linear response to nitrogen applications. NDVI strongly correlated to yield and protein, in which NDVI, yield and protein increased with the highest available nitrogen.
- A positive yield response may be attributed to higher number of branches, pods per plant, seeds per pods, and seed-carrying pods under high nitrogen conditions.
- High nitrogen rates are required to achieve maximum yield and proteins; however, excessive applications can cause substantial nitrogen losses, reduced nitrogen-use efficiency, and lodging.
- Controlling the rate of nitrogen supply with enhanced-efficiency fertilizers can improve nitrogen-use efficiency by reducing the amount of nitrogen losses that occur until the period of rapid crop uptake.
- A significant interaction for product type and placement occurred, indicating that greater losses were recorded for split broadcast applications of urea compared to the enhanced- efficiency fertilizer applications.

The full report is available at www.warc.ca. Project was supported by the Agricultural Demonstration of Practices and Technologies (ADOPT) initiative under the Canada-Saskatchewan Growing Forward 2 bi-lateral agreement
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- Fertilizer placement (sideband ≥ broadcast > split broadcast) in general played a significant role in plant growth (NDVI, P=0.0003) and seed production (yield, P=<0.0001).
- In general, these results indicate that utilizing the proper rate, source and placement can influence overall plant growth and seed production.

Figure 1. Product placement and product type interaction effect on plant biomass measured via NDVI, yield (bu per acre), and seed protein content on canola, Scott, SK 2017.

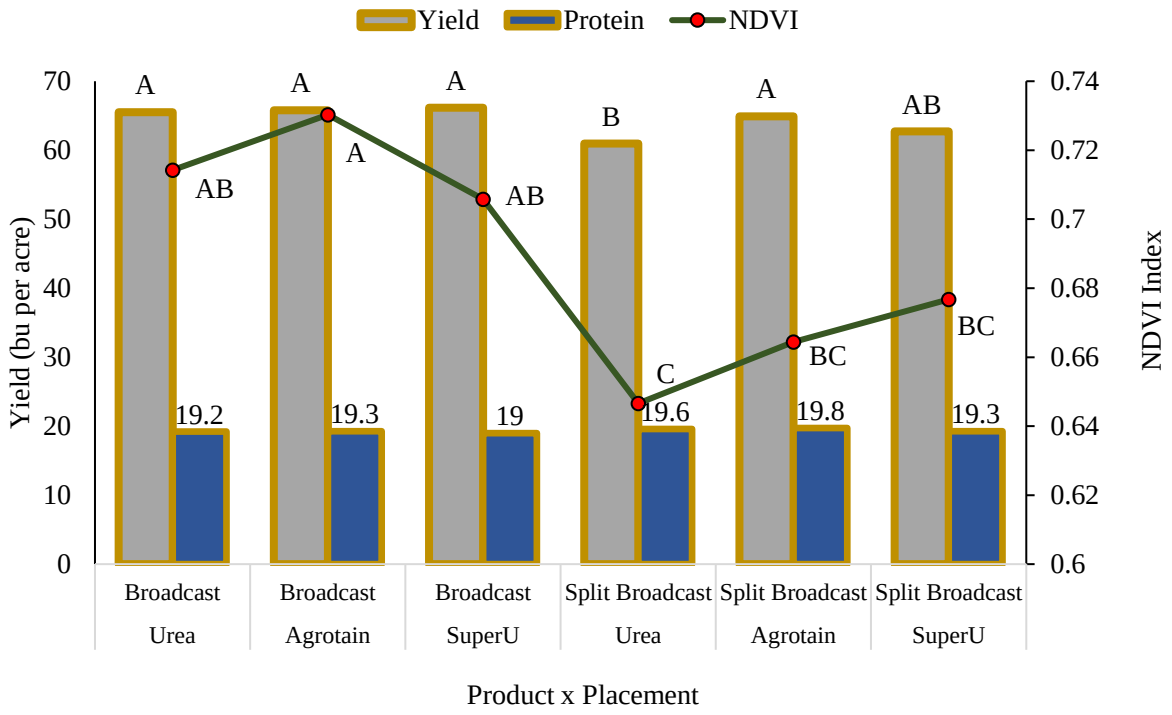
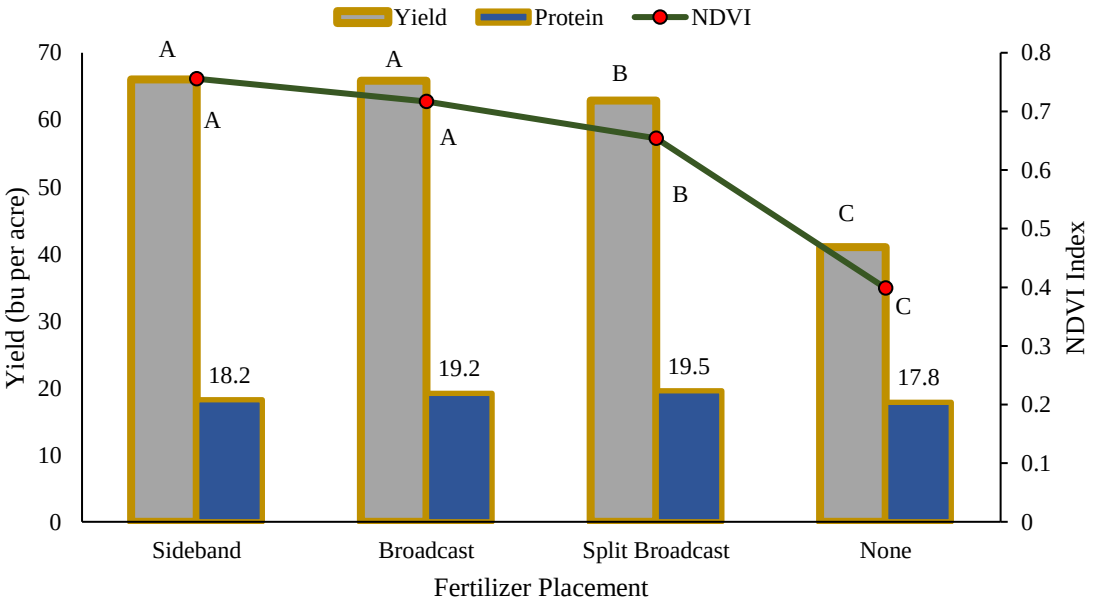


Figure 2. Fertilizer placement effect on plant biomass measured via NDVI, yield (bu per acre), and seed protein content on canola, Scott, SK 2017.



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