Broderick Irrigated Field Demonstrations of Enhanced Efficiency Nitrogen Fertilizers Applied on Canola

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Abstract:

Nitrogen fertilizer field demonstrations were completed in both 2018 and 2019 in the Broderick irrigated area near Outlook, SK with canola. The projects compared performance of different nitrogen sources. The products were broadcast on the soil surface to maximize time efficiency for producers.

Project Objective:

The objective of the projects was to increase canola yield by reducing nitrogen nutrient loss in an irrigated field.

Demonstration Site:

In 2018, the project was located on Dark Brown Tuxford clay loam, a mixture of solonetz and solodized solonetz soils. The site was developed for irrigation in 2004. A second project seeded in 2019 was located on Dark Brown Asquith fine sandy loam soil formed on fluvial parent material. This site was developed for irrigation in 1969 using gravity supplied irrigation water. The field was converted to sprinkler pivot irrigation in 1995.

Project Methods and Observations:

Nitrogen was broadcast on the soil surface in spring 2018 at 140 lb N/ac just prior to seeding. The fertilizer was applied with a 70 ft Case IH Titan 4530 floater on May 14, 2018. The four fertilizers applied in spring 2018 included bare urea, Agrotain treated urea, bare Amidas, and Super U. The site was seeded with a Bourgault air seeder. Phosphorus was applied side banded at 50 lb P205/ac. The site was harvested Sept. 28, 2018. For the 2019 project, the nitrogen fertilizer was broadcast on the soil surface in fall on November 20, 2018 with the same 70 ft Case IH Titan 4530 floater. The treatment list in 2019 included an additional treatment - Agrotain treated Amidas. The 2019 project received 125 lb N/ac. The N was applied broadcast on the soil surface. There was a skiff of snow present, and the soil was slightly frozen. The project was seeded May 18 with an air drill. Phosphorus was applied side banded at 50 lb P205/ac.

Table 1: Broadcast Fertilizer Application

2018		2019	
Nitrogen Source	Rate of Product @ 140 lb N/ac	Nitrogen Source	Rate of Product @ 125 lb N/ac
Bare Urea	304	Bare Urea	272
Agrotain treated Urea	304	Agrotain treated Urea	272
Amidas	350	Amidas	313
Super U	304	Agrotain treated Amidas	313
		Super U	272

Figure 1: Canola yield (bu/ac) using enhanced efficiency fertilizer applied broadcast to cereal stubble in spring. N Rate = 140 N/ac

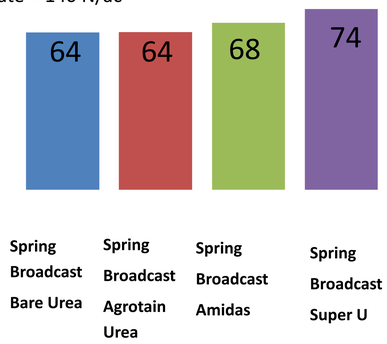
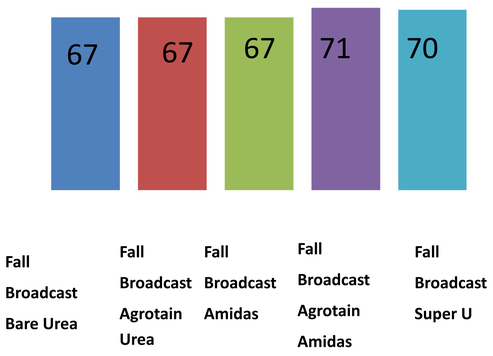


Figure 2: Canola yield (bu/ac) using enhanced efficiency fertilizer applied broadcast to cereal stubble in fall.

N Rate = 125 lb N/ac



Results:

The demonstrations showed that the more costly environmentally friendly fertilizer treatments have potential to yield superior financial returns as well as benefits for the environment. Maaz (2018) found that the yield increase with use of urease inhibitors in the North American Great Plains was positive on average (7%), but the median of these observations was only 0%.

Table 2 Economic Analysis of ICDC Fertilizer Demonstrations

2018 Demonstration : Fertilizer Broadcast May 14, 2018 Seeded May 15, 2018				
	cents/lb N	Yield	140 N/ac	Net Revenue
Spring Urea	50	64	$70.00	$615.08
Spring Agrotain Urea	58	64	$81.20	$603.88
Spring Super U	65	74	$88.20	$703.60
Spring Amidas	59	68	$82.60	$645.00
	Harvested September 28, 2018			
2019 Demonstration: Fertilizer broadcast November 20, 2018				
	cents/lb N	Yield	125 N/ac	Net Revenue
Fall Urea	49	67	$61.25	$655.65
Fall Agrotain Urea	57	67	$71.25	$645.65
Fall Super U	64	70	$80.00	$669.00
Fall Amidas	59	67	$73.75	$643.15
Fall Agrotain Amidas	67	71	$83.75	$675.95
Seeded May 18, 2019 Harvested October 13, 2019				

Conclusion:

Enhanced efficiency nitrogen fertilizer does increase costs, but net revenue with some of the products was still better than less costly alternatives under irrigated conditions. The best performing fertilizer products were spring Super U in 2018 and fall Agrotain Amidas in 2019. Under some conditions, nitrogen products which reduce nitrous oxide emissions can still provide more economical agronomic production than the less costly nitrogen alternatives.

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Disclaimer: Fertilizer prices fluctuate with market conditions. The economic analysis is for illustrative purposes only.

References:

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ICDC Irrigation Crop Diversification Corporation

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