



Fertigation of wheat and canola

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In canola, the net return with the full rate of nitrogen side-banded at seeding was always greater than the same rate split-applied as side-banded N and fertigation. In HRSW spring wheat, late-season in-crop applications of N by fertigation could be used to boost grain protein, resulting in potentially higher net returns.

An irrigation study in southern Alberta compared spring-banded nitrogen (N) to spring-banded N plus fertigation at three plant growth stages for spring wheat and canola over 4 years from 2013 through 2016. The objectives were to quantify the yield and quality effects of N fertigation applied to wheat and canola, and to determine the financial implications for growers.

Urea (46-0-0) was side-banded at seeding at 27, 53, 80, and 107 lbs. N/acre (30, 60, 90, and 120 kg/ha). An additional treatment of side-banded controlled release ESN at 53 lbs. N/ac was also applied. Each N rate received one of five fertigation treatments of UAN (28-0-0) at 27 lbs. N/ac with 12 mm of water:

- a check without UAN but with water applied,
- early tillering for wheat and the fourth-leaf rosette stage for canola,
- flag leaf for wheat and the bolting stage for canola,
- anthesis for wheat and early flowering for canola,
- an application of 27 lbs. N/ac at all three growth stages for both crops.

The net return (NR) was calculated as the difference between total revenue and total cost. Total revenue was the price per bushel (including the protein premium for wheat) and yield. Ten year average prices were \$5.58 per bushel for 13.5% protein wheat, and \$9.66 per bushel for canola. Protein premiums for wheat were estimated from reported premiums for 1998/1999 to 2014/2015. Protein premium scenarios were based on average (base), high, low and no premiums.

Production costs included seed, fertilizer, pesticides, irrigation, fertigation, machinery, grain hauling, land rental, and insurance, and were based on 2014 costs using custom rates for the field operations.

A comparison of ESN and urea at 53 lbs. N/ac found no statistically significant difference in yield or net return by N form, so data analysis did not include ESN results.

Fertigation provided little benefit in canola

In canola, when banded N rates were 80 or 107 lbs. N/ac, there was no yield benefit from fertigation. When total banded N was 27 or 53 lbs. N, yield was the same whether the N was banded, applied by fertigation, or was a combination of banded and fertigation, but yield and net return were not optimized at these lower levels of N fertilization.

In the absence of fertigation, the 107 lbs. banded N provided the highest net return of \$304 per acre. When comparing net return based on total N applied, the net return with only banded N was always greater than combinations of banded N and fertigation, but significant for only the high banded rates of 80 lbs. and 107 lbs. N. This indicated that there was little benefit to fertigation in this study for canola.

Fertigation could increase net return in wheat

In wheat without fertigation, the 80 lbs. N side-band rate yielded 76 bu/ac. (5132 kg/ha), and the 107 lbs. N side-band rate yielded 79.5 bu/ac (5346 kg/ha); both significantly higher than lower N application rates.

When, the same total N (banded plus fertigation) rate was applied, there was no difference in yield based on the N timing. For example, 53 lbs. N side-banded plus 27 lbs. N fertigation at tillering produced a yield of 77 bu/ac (5182 kg/ha) compared to 76 bu/ac when 80 lbs. N was applied as a side-banded

The benefit of wheat fertigation was seen in protein content. Protein content increased from 12.3% with no fertigation up to 13.7% when fertigation was applied at anthesis.

Because spring-banded N can be substituted with fertigation N without yield loss, late-season in-crop applications of N by fertigation could be used to boost grain protein, and potential net return.

For example, with an average (\$0.52/bu at 14.75% protein) or high premium (\$1.16/bu @ 14.75% protein), net return was higher with fertigation, especially when applied at flag leaf or anthesis. When no or low (\$0.14/bu @14.75% protein) premiums were offered, there was no benefit to split N applications with fertigation.

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