Can ultra-early seeding and enhanced-efficiency fertilizers pay?

Spring wheat field trials, fertilizer costs, and what the results could mean for Prairie farmers

Why this matters

Producers pay for fertilizer and seeding decisions before knowing the harvest outcome. Enhanced-efficiency fertilizers (EEFs) may reduce nitrogen losses, but their price premiums need to be justified by yield gains, cost savings, or other benefits. Ultra-early seeding may boost production, although the payoff varies with location, weather, and the rest of the farm's seeding schedule.

Why the highest yield may not pay

The economically optimal nitrogen rate (EONR) occurs where the extra grain revenue from another unit of fertilizer equals the cost of that unit. Beyond this point, more nitrogen lowers profit even if yield still increases. Result 1 shows that in 2020 at Vermilion, SuperU reached its EONR at 74.9 lb N/acre (104.8 bu/acre), compared with 90.7 lb N/acre for urea (104.5 bu/acre).

What did the field trials show?

In the 2024–2025 AAFC trials, ultra-early seeding increased spring wheat yields across fertilizer types, with larger gains at some sites than others. At the nitrogen rates tested, SuperU and eNtrench generally produced yields similar to conventional urea; fertilizer premiums were therefore not consistently recovered through higher grain revenue.

Ultra-early seeding: promising, but location matters

The profitability chart (Result 2) compares the return from seeding earlier rather than at the conventional date when applying untreated urea (additional spring wheat revenue net of fertilizer-cost differences per acre). In the 2024–2025 trials, earlier seeding improved estimated returns in most locations, but not everywhere. Examples: Lethbridge dryland gained $129/acre in 2024 and $59/acre in 2025, while Lacombe gained $10/acre in 2024 but lost $40/acre in 2025. These comparisons exclude the opportunity cost of delaying other crops in the seeding schedule.

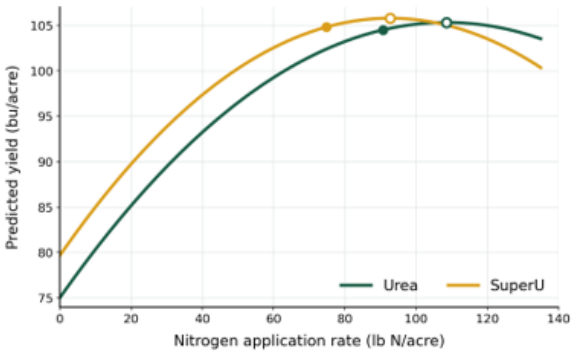
What about nitrous oxide emissions (N_2O)?

The separate 2024–2025 seeding-date trials predict lower N_2O emissions with EEFs than with untreated urea. This matters even where fertilizer premiums are not offset by higher spring wheat yield. Emissions reductions and economic gains should be evaluated together.

Can SuperU pay at a lower nitrogen rate?

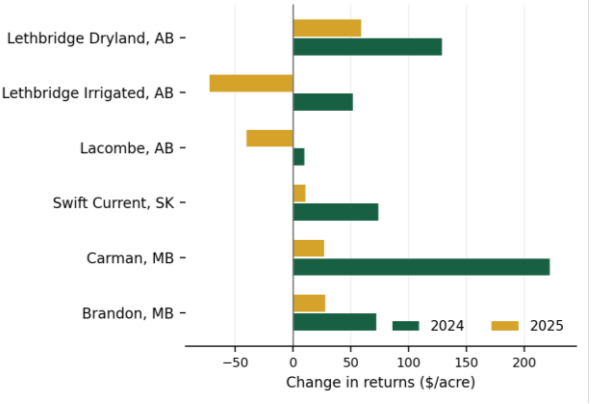
New analysis (Result 3) from M.Sc. student Shayan Wali studied 21 site-years (2019–2022) at Lethbridge Dryland, Lethbridge Irrigated, Scott, Beaverlodge, Edmonton, Vermilion and Indian Head. Using econometric analysis, he estimated the economically optimal nitrogen application rates for five fertilizer products: urea, ESN, SuperU, Agrotain, and eNtrench. Across the field trials, SuperU had the highest estimated return in 14 site-years. The EONR was lower for SuperU than for urea in every site-year, and on average obtained higher profits.

Result 1 | EONR: Urea vs. SuperU



Solid dots mark economically optimal nitrogen rate (EONR); open circles mark maximum yields. The economically optimal rate is lower than the yield-maximizing rate.

Result 2 | Ultra-early vs. Conventional Seeding



Result 3 | EONRs and Change in Financial Returns

Fertilizer Product	Average EONR (lb N/acre)	Average Profit Gain ($/acre)
Urea	88.5	Reference
ESN	73.8	-12.42
SuperU	**72.7**	**+4.39**
Agrotain	87.6	-0.16
eNtrench	89.1	-4.49

Return differences compare products at their own estimated economic optimum; means weight each available site-year equally. These are grain revenue minus fertilizer cost estimates, not whole-farm net profits. Other production costs are excluded.

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