Replenish NUTRIENTS

MULTI-YEAR RETURN ON INVESTMENT FIELD TRIAL

WHITEPAPER

2023 GROWING SEASON

YEAR 2: FARMING SMARTER PARTNERSHIP

"Continued Growth: Evaluating Crop Growth and ROI in Year 2 (2023)"

www.replenishnutrients.com

Executive Summary

In the second year of the multi-year field trial, the collaboration between Replenish Nutrients and Farming Smarter remains stable. Consistent site locations and unchanged fertilizer treatments ensure reliability in data collection methods. The data presented in this case study document is the average across all three locations (Brooks, Bow Island, and Lethbridge). The Year 2 findings aim to empower growers with actionable insights into optimizing crop health, yield, and economic returns. Our commitment to transparency and sustainable practices reinforces our dedication to providing concise, valuable information for informed decision-making. Please note that while Farming Smarter collected the data, Replenish Nutrients analyzed the data for this economic case study, ensuring accuracy and impartiality in our findings.

Case Study

This multi-year project will evaluate the Return-on-Investment (ROI) for Replenish Nutrients products in a crop rotation trial in Southern Alberta using crop growth, yield, and soil health testing to determine the effect of treatments. Crop yield data will be analyzed against current crop input and commodity prices to determine the potential ROI for growers in Alberta.

This trial is designed to understand the economic and environmental impact of replacing the synthetic form of phosphorus (P), potassium (K) and sulphur (S) with a sustainable alternative.

This third-party trial will test the economic effect of incorporating Replenish Nutrients products into an agricultural system. This information can then form the basis for the wider application of Replenish Nutrients products in other parts of Western Canada.

Are Higher Yields Better?

The trial is designed to control for variables, focusing solely on whether Replenish Nutrients products or synthetic fertilizer products adequately supply the P, K, and S requirements. Synthetic nitrogen (N) remains consistent across all treatments to ensure experimental integrity. Specifically, the trial assigns the Rebuilder formula to fulfill the P and S requirements, while the HESO treatment addresses the K and S requirements. Synthetic nitrogen (N) or MAP is applied uniformly to maintain equivalent nutrient levels unless specified otherwise. This experimental framework facilitates precise evaluation of the efficacy and performance of Replenish Nutrients products in comparison to synthetic alternatives within a scientific context.

Trial Design: Objectives

Growth & Yield	To determine the effect of product treatments on crop growth and yield. Multiple crop growth, tissue testing, and yield parameters will be measured, including stand density, plant height, days to maturity, grain yield, and quality.
Health Indicators	To determine the effect of the product treatments on soil health indicators. The effect of treatments on physical, chemical, and biological soil health parameters will be measured.
Return-on-Investment	Calculate customers' ROI based on their fertilizer program, yield data and current commodity prices.

Field Trial Details

Alberta Field Trial locations in Brooks, Bow Island and Lethbridge

Products tested on canola, wheat and fababean

ROI Calculation using actual fertilizer and commodity prices

Soil sampling completed by **Down to Earth Lab** and **CARA Soil Health Lab**

Canola in Bow Island, Brooks and Lethbridge, AB (all locations)

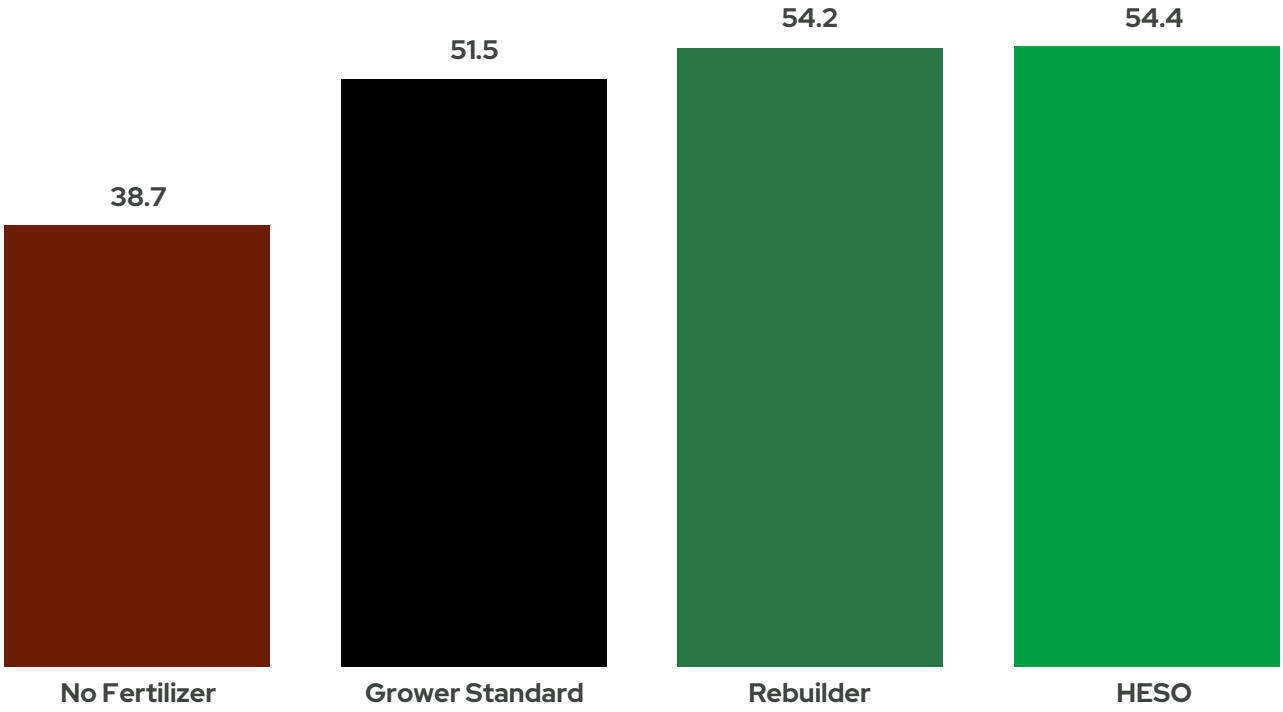
Canola Plot: August 19, 2023

YEAR 2: FARMING SMARTER PARTNERSHIP

"Continued Growth: Evaluating Crop Growth and ROI in Year 2 (2023)"

Year 2 Results: Canola

Average Yield (bu/acre)



The utilization of Replenish Nutrients **Rebuilder (54.2 bu/acre)** and **HESO (54.4 bu/acre)** yielded improved results compared to the grower's standard fertility program (51.4 bu/acre).

Table 1: Treatment Cost per Acre - Canola

Treatment	UREA 46-0-0	MAP 11-52-0	AMS 21-0-0-24	Rebuilder 0-17-0-12	HESO 0-9-20-20	Total	Price Difference vs. Grower Standard
No Fertilizer	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	- $158.85
Grower Standard	$114.39	$21.12	$15.98	$0.00	$0.00	**$151.49**	-
Rebuilder	$124.89	$0.00	$7.72	$18.31	$0.00	**$150.92**	- $0.57
HESO	$128.81	$10.07	$1.33	$0.00	$22.91	**$163.12**	**$11.63**

Note 1: Baseline soil testing available nutrients: 10 lbs. N, 39 lbs P, 515 lbs. K and 13 lbs S (averaged across all locations)

Note 2: The recommended fertility rate was 168 lbs. N, 20 lbs. P, 0 lbs. K and 20 lbs. S for a target of 60 bu/acre

Note 3: The HESO treatment received an additional 20 lbs/acre of K. The other treatments did not receive any K.

Return-on-Investment Calculation Year 2: Canola

The following factors should be evaluated when calculating ROI:

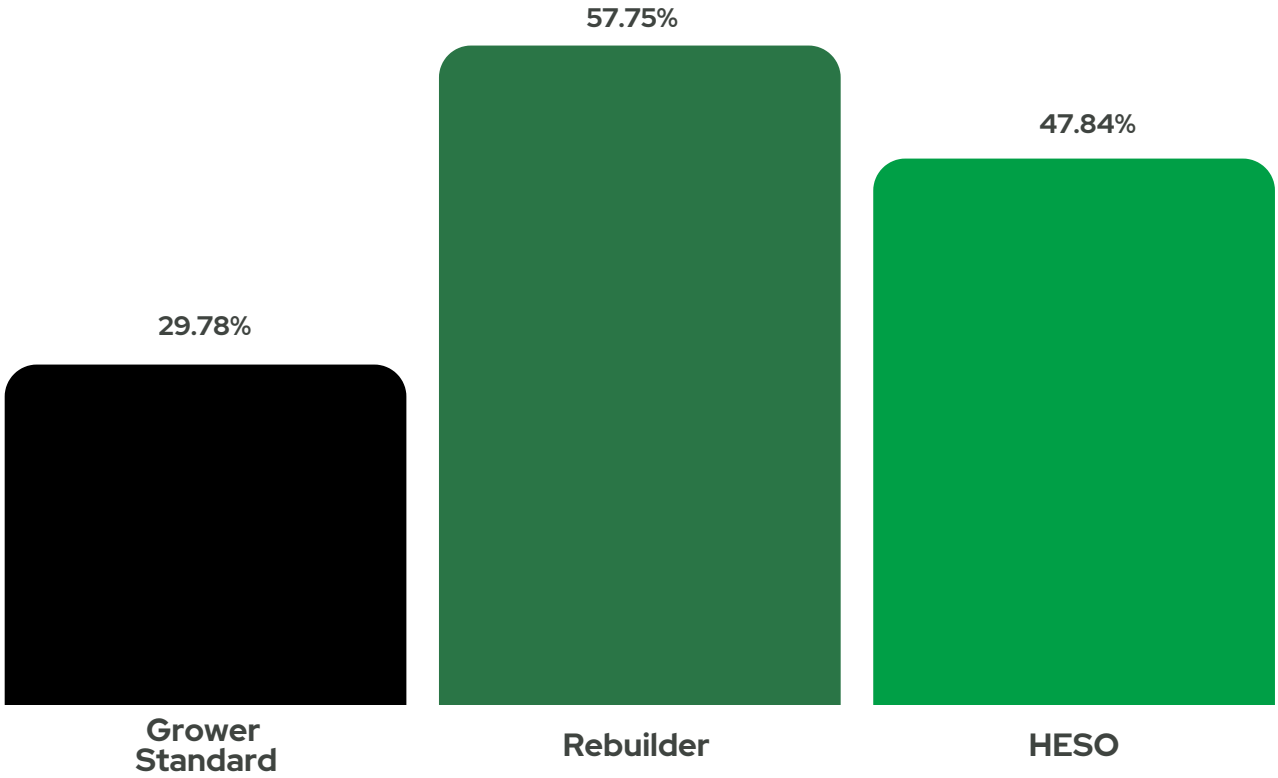
- Cost Per Acre: How much will switching from one product to another cost?
- Yield Per Acre: What was the effect of each treatment on crop growth and yield?
- Crop Value: Current commodity grain/crop price.
- Acres: Across how many acres will the treatment be used on?
- Years of Use: What is the product benefit after 1, 5, and 10 years?

Table 3: Return-on-Investment Calculation - Canola

Assumption	No Fertilizer	Grower Standard	Rebuilder	HESO	Explanation
Treatment Cost/Acre	$0.00	$151.49	$150.92	$163.12	How much the treatments cost based on fertilizer market prices in May 2023.
Yield/Acre	38.7	51.5	54.2	54.4	Average yield data per treatment
Crop Spot Price/Bu	$15.36	$15.36	$15.36	$15.36	November 2023 Canola prices provided by PDQ.
Fertilizer Type Income	$594.43	$791.04	$832.51	$835.58	Crop spot price multiplied by yield
Additional Income	-	$196.61	$238.08	$241.15	Fertilizer Type Income - No Fertilizer Income
ROI	-	29.78%	57.75%	47.84%	The percent of additional income gained from the treatment after recouping the treatment cost.
ROI VS GS	-	-	**27.97%**	**18.06%**	ROI Comparison vs. Grower Standard

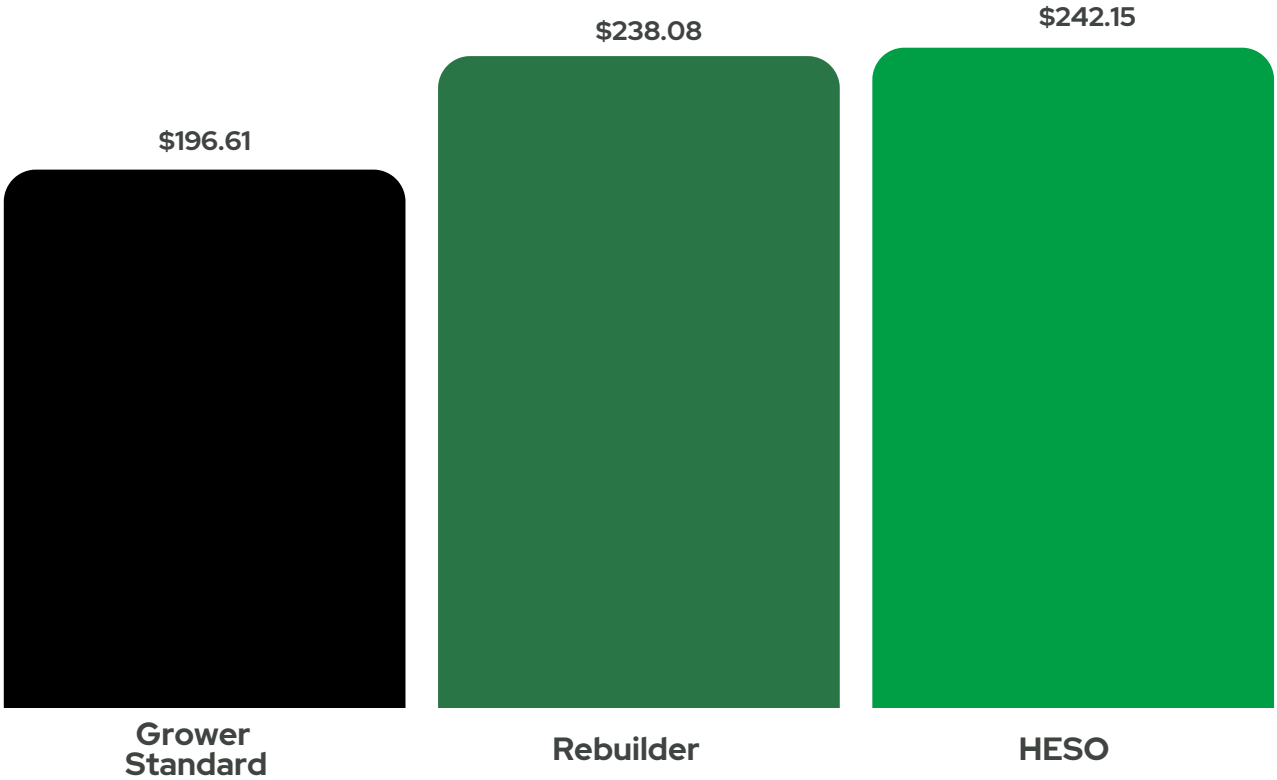
Return-on-Investment Year 2 : Canola

Return-on-Investment



Note 1: Return-on-Investment (ROI) is calculated as the percent of additional income gained from the treatment after recouping the treatment cost.

Additional Income per Acre



Note 1: Additional income is determined by multiplying the yield by the crop spot price and then subtracting the income from the no fertilizer treatment.

Wheat in Bow Island, Brooks and Lethbridge, AB (all locations)

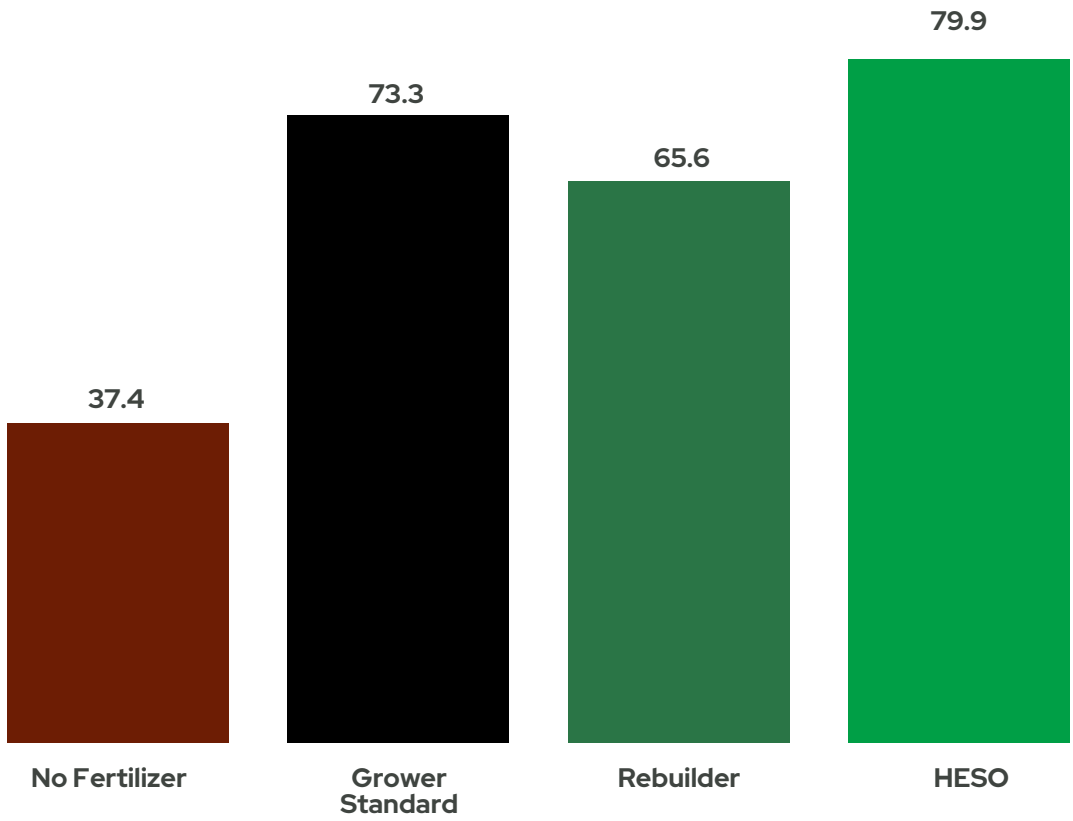
Wheat Harvest: September 19, 2023

YEAR 2: FARMING SMARTER PARTNERSHIP

"Continued Growth: Evaluating Crop Growth and ROI in Year 2 (2023)"

Year 2 Results: Wheat

Average Yield (bu/acre)



Using **HESO (79.9 bu/acre)** resulted in a positive yield benefit, while **Rebuilder (65.6 bu/acre)** did not provide equivalent yields to the grower standard (73.3 bu/acre).

Table 4: Treatment Cost per Acre - Wheat

Treatment	UREA 46-0-0	MAP 11-52-0	AMS 21-0-0-24	Rebuilder 0-17-0-12	HESO 0-9-20-20	Total	Price Difference vs. Grower Standard
No Fertilizer	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	- $137.56
Grower Standard	$105.08	$23.16	$9.32	$0.00	$0.00	$137.56	-
Rebuilder	$114.92	$0.00	$2.20	$20.07	$0.00	$137.20	**- $ 0.36**
HESO	$115.18	$10.33	$0.00	$0.00	$34.36	$159.86	**$16.78**

Note 1: Baseline soil testing available nutrients: 12 lbs. N, 37 lbs P, 499 lbs. K and 14 lbs S (averaged across all locations)

Note 2: The recommended fertility rate was 148 lbs. N, 22 lbs. P, 0 lbs. K and 11 lbs. S for a target of 80 bu/acre

Note 3: The HESO treatment received an additional 30 lbs/acre of K and 25 lbs of S. The other treatments did not receive any K.

Return-on-Investment Calculation Year 2: Wheat

The following factors should be evaluated when calculating ROI:

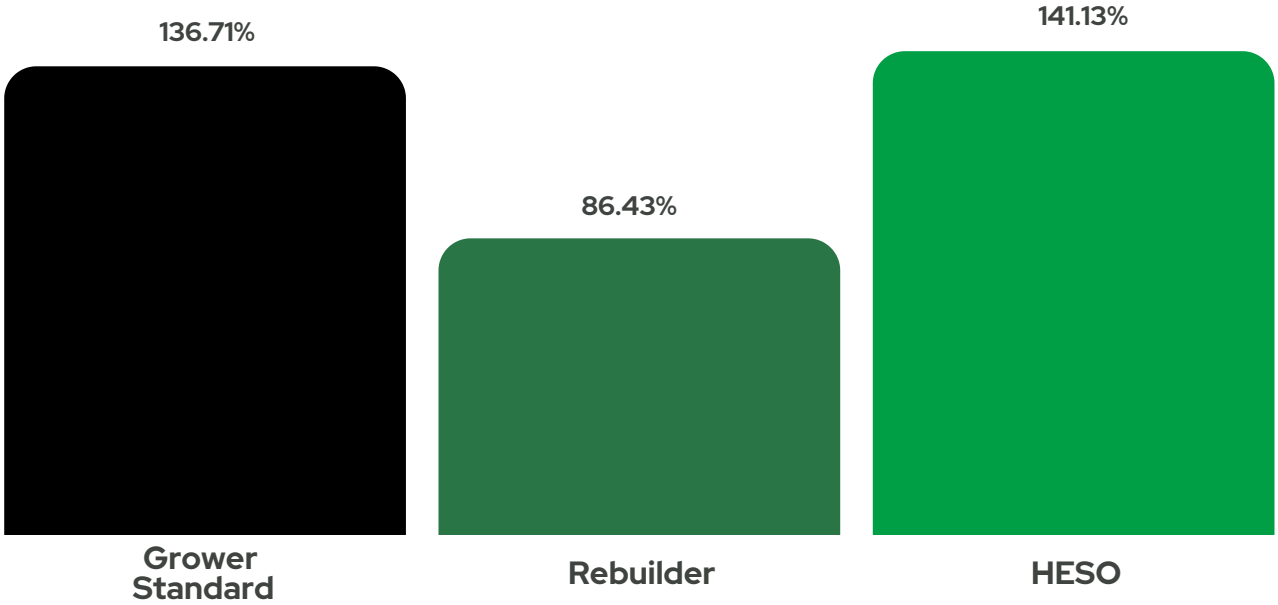
- Cost Per Acre: How much will switching from one product to another cost?
- Yield Per Acre: What was the effect of each treatment on crop growth and yield?
- Crop Value: Current commodity grain/crop price.
- Acres: Across how many acres will the treatment be used on?
- Years of Use: What is the product benefit after 1, 5, and 10 years?

Table 6: Return-on-Investment Calculation - Wheat

Assumption	No Fertilizer	Grower Standard	Rebuilder	HESO	Explanation
Treatment Cost/Acre	$0.00	$137.56	$137.20	$159.86	How much the treatments cost based on fertilizer market prices in May 2023
Yield/Acre	37.4	73.3	65.6	79.9	Average yield data per treatment
Crop Spot Price/Bu	$9.07	$9.07	$9.07	$9.07	September 2023 Wheat prices provided by Alberta Wheat Commission
Fertilizer Type Income	$339.22	$664.83	$594.99	$724.69	Crop spot price multiplied by bushel's produced
Additional Income	-	$325.61	$255.77	$385.48	Fertilizer Type Income - No Fertilizer Income
ROI	-	136.71%	86.43%	141.13%	The percent of additional income gained from the treatment after recouping the treatment cost.
ROI VS GS	-	-	-50.28%	**24.21%**	ROI Comparison vs. Grower Standard

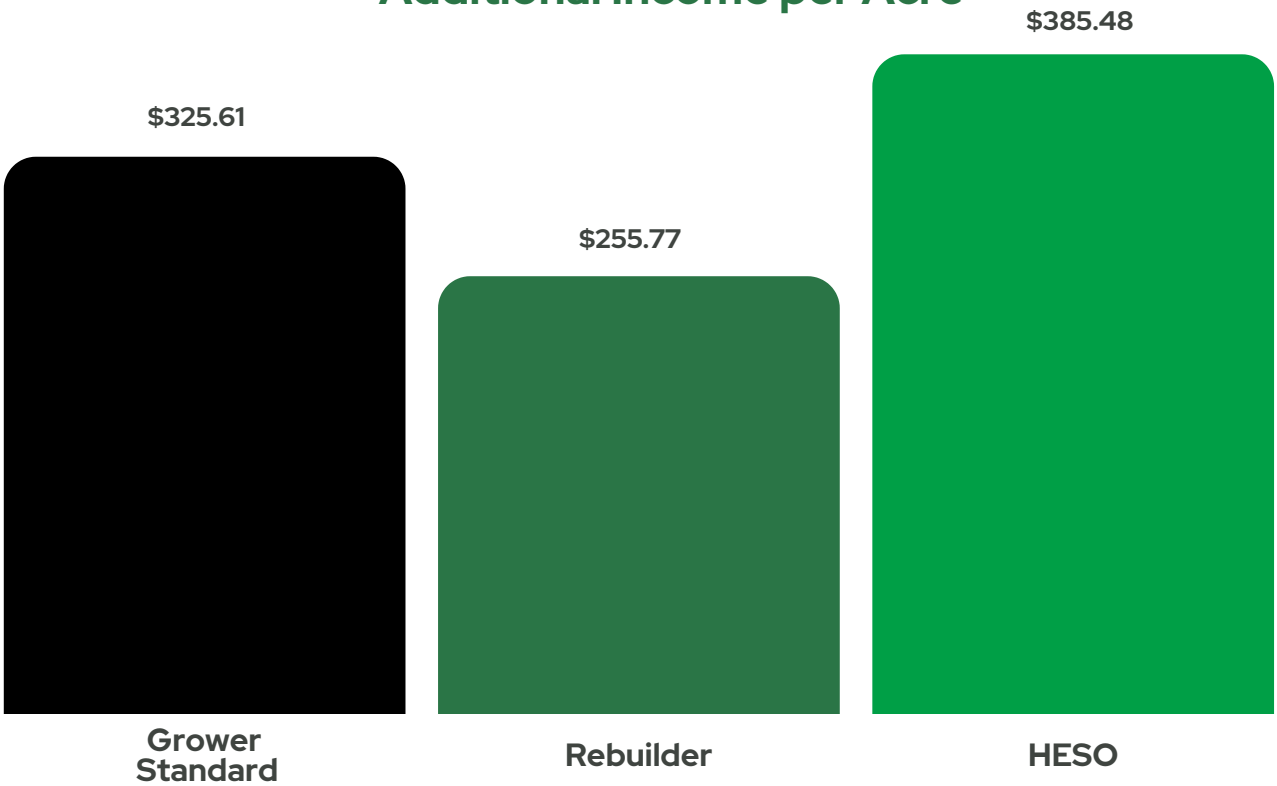
Return-on-Investment Year 2: Wheat

Return-on-Investment



Note 1: Return-on-Investment (ROI) is calculated as the percent of additional income gained from the treatment after recouping the treatment cost.

Additional Income per Acre



Note 1: Additional income is determined by multiplying the yield by the crop spot price and then subtracting the income from the no fertilizer treatment.

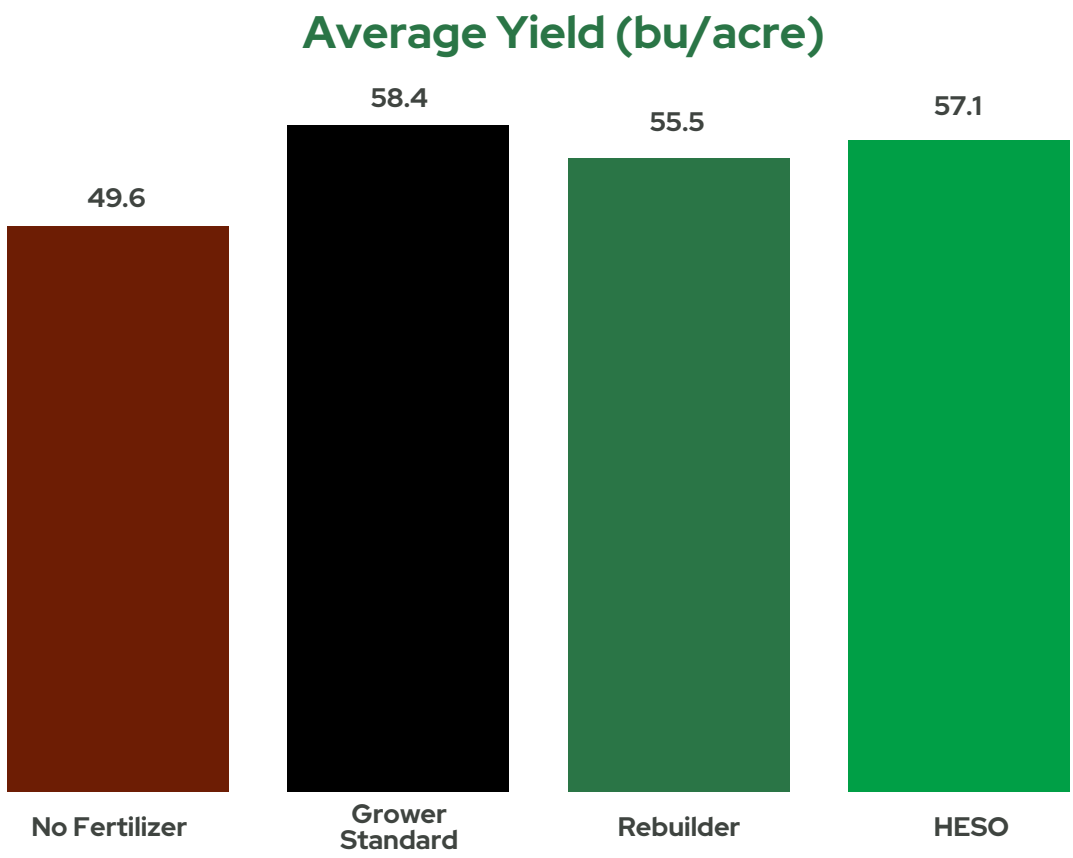
Faba Bean in Bow Island, Brooks and Lethbridge, AB (all locations)

Faba Bean Plots: July 26, 2023

YEAR 2: FARMING SMARTER PARTNERSHIP

"Continued Growth: Evaluating Crop Growth and ROI in Year 2 (2023)"

Year 2 Results: Faba Bean



The use of both **Rebuilder (55.5 bu/acre)** and **HESO (57.1 bu/acre)** provided statistically equivalent yields to the grower standard (58.4 bu/acre).

Table 7: Treatment Cost per Acre - Faba Beans

Treatment	UREA 46-0-0	MAP 11-52-0	AMS 21-0-0-24	Rebuilder 0-17-0-12	HESO 0-9-20-20	Total	Price Difference vs. Grower Standard
No Fertilizer	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	- $30.29
Grower Standard	$0.00	$16.97	$13.31	$0.00	$0.00	$30.28	-
Rebuilder	$0.00	$0.00	$6.95	$15.02	$0.00	$21.97	**- $8.31**
HESO	$0.00	$9.42	$0.00	$0.00	$22.91	$32.33	**$2.05**

Note 1: Baseline soil testing available nutrients: 12 lbs. N, 39 lbs P, 551 lbs. K and 12 lbs S (averaged across all locations)

Note 2: The recommended fertility rate was 0 lbs. N, 17 lbs. P, 0 lbs. K and 17 lbs. S for a target of 80 bu/acre

Note 3: The HESO treatment received an additional 20 lbs/acre of K. The other treatments did not receive any K.

Return-on-Investment Calculation Year 2: Faba Bean

The following factors should be evaluated when calculating ROI:

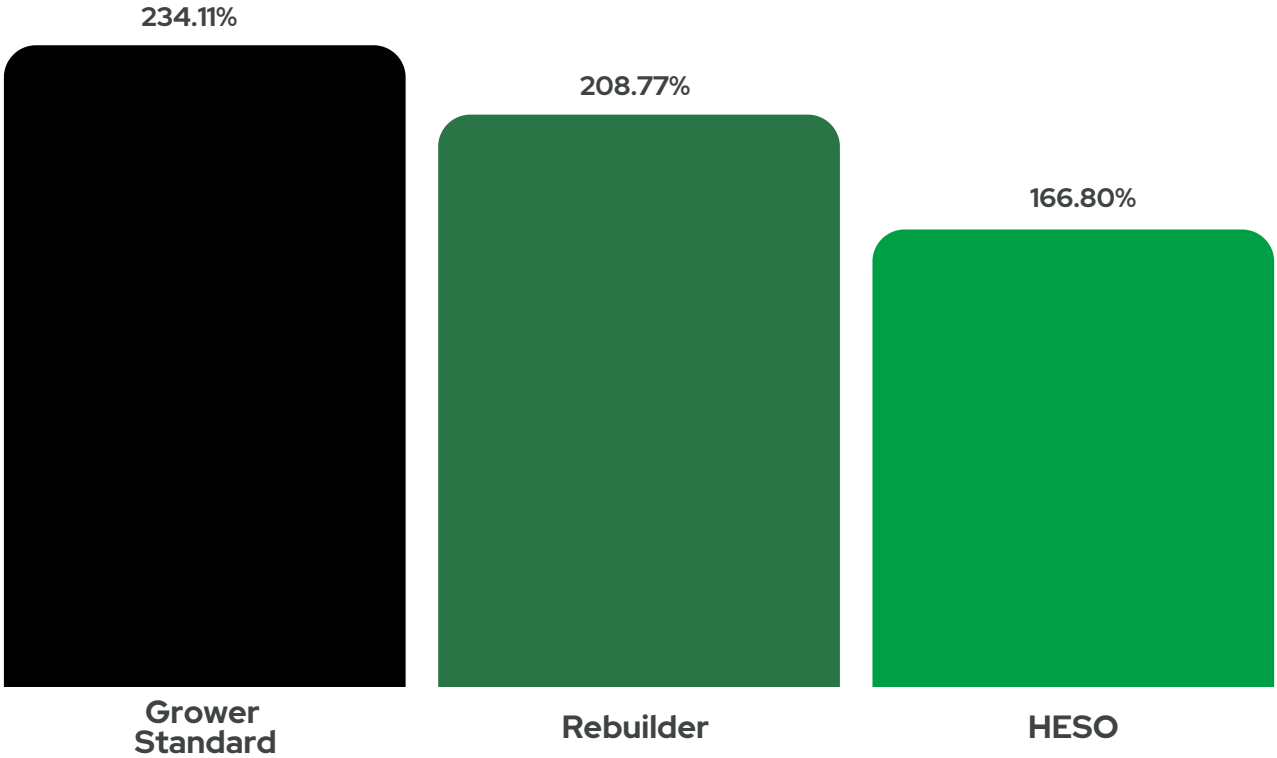
- Cost Per Acre: How much will switching from one product to another cost?
- Yield Per Acre: What was the effect of each treatment on crop growth and yield?
- Crop Value: Current commodity grain/crop price.
- Acres: Across how many acres will the treatment be used on?
- Years of Use: What is the product benefit after 1, 5, and 10 years?

Table 9: Return-on-Investment Calculation - Faba Bean

Assumption	No Fertilizer	Grower Standard	Rebuilder	HESO	Explanation
Treatment Cost/Acre	$0.00	$30.28	$21.97	$32.33	How much the treatments cost based on fertilizer market prices in May 2023
Yield/Acre	49.6	58.4	55.5	57.1	Average yield data per treatment
Crop Spot Price/Bu	$11.50	$11.50	$11.50	$11.50	December 2023 Faba Bean prices provided by Rayglen Commodities Inc.
Fertilizer Type Income	$570.40	$671.60	$638.25	$656.65	Crop spot price multiplied by bushel's produced
Additional Income	-	$101.20	$67.85	$86.25	Fertilizer Type Income - No Fertilizer Income
ROI	-	234.11%	208.77%	166.80%	The percent of additional income gained from the treatment after recouping the treatment cost.
ROI VS GS	-	-	-25.34%	-67.31%	ROI Comparison vs. Grower Standard

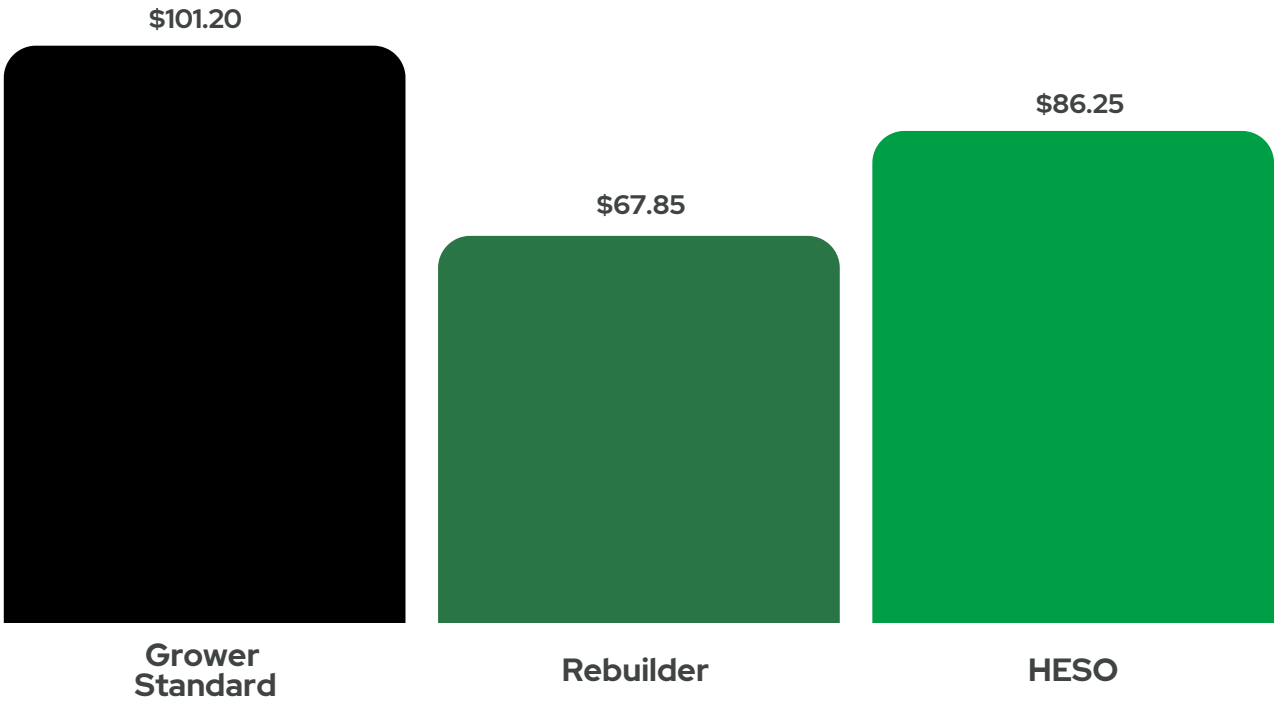
Return-on-Investment Year 2: Faba Bean

Return-on-Investment



Note 1: Return-on-Investment (ROI) is calculated as the percent of additional income gained from the treatment after recouping the treatment cost.

Additional Income per Acre



Note 1: Additional income is determined by multiplying the yield by the crop spot price and then subtracting the income from the no fertilizer treatment.

"With the HESO and Rebuilder performing as well as the standard fertilizer, growers can be confident that there will be no loss in crop performance by using those products. Also, the products can be applied the same as standard nutrients because they are all dry granular products of similar size and shape.

Trevor Deering

Custom Research Team Lead

Farming Smarter

Conclusion

In the second year of our ongoing field trial collaboration with Farming Smarter, we continue to explore the impact of Replenish Nutrients' innovative products on crop performance and economic returns. This report focuses on key findings related to yield, emphasizing the enduring effects of fertilizer treatments on Canola, Wheat, and Faba Bean across three different locations – Brooks, Bow Island, and Lethbridge.

Our Rebuilder and HESO treatments showcased remarkable results in **Canola** cultivation, with both treatments delivering equivalent compared to the Grower Standard fertility program. The data demonstrates the potential for not only maintaining but enhancing crop productivity while utilizing Replenish Nutrients' solutions.

The HESO formula demonstrated a favourable ROI and yield advantage, particularly noticeable in crop yield. Conversely, our Rebuilder formulation faced challenges in **Wheat** cultivation, failing to match the yields achieved with the Grower Standard.

In the case of **Faba Bean**, both Rebuilder and HESO treatments exhibited statistically equivalent yields to the Grower Standard. Although the return-on-investment calculations fell below the grower standard, they revealed a positive financial gain compared to the no-fertilizer treatment. It's important to note that these results may be influenced by the exceptional performance of the no-fertilizer treatment, which can be attributed to the inherent ability of faba beans to fix nitrogen from the atmosphere.

The **Return-On-Investment (ROI)** analysis underscores the economic viability of incorporating Replenish Nutrients products into fertilization practices. Growers can potentially achieve substantial additional income while ensuring sustainable and efficient nutrient management. The positive return-on-investment percentages further support the economic benefits of our products compared to the Grower Standard.

As we move forward, our commitment to transparency, sustainability, and providing valuable insights remains unwavering. The results presented in this case study document serve as a testament to the ongoing success of our collaboration and the potential benefits that Replenish Nutrients' products bring to modern agriculture. These findings not only contribute to the scientific understanding of crop nutrition but also empower growers to make informed decisions that align with their goals of maximizing yield, optimizing crop health, and ensuring economic prosperity. We look forward to the continued success of this trial and the positive impact it will have on the agricultural community.

Get in Touch!

Send an email to
info@replenishnutrients.com

Renew.
Revive.
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