ANNELIDA
SOIL SOLUTIONS

**Testing AnneMaxx™ Products in Canola Production**
**in Saskatoon, Saskatchewan and Morden, Manitoba in 2025**
**Research Project 5 – Final report**


## Abstract

Field trials conducted in 2025 in Saskatoon, SK and Morden, MB evaluated the agronomic performance and economic viability of AnneMaxx™ (Annelida) products under a reduced-fertilizer regime. Using a randomized complete block design with six replications, five fertilizer-product regimes were compared: a full-rate control (100% of the recommended nutrients, no AnneMaxx™), a reduced-fertilizer control (75% of the recommended nutrients, no AnneMaxx™), a granular treatment (75% fertilizer + AnneMaxx™ Biome applied in-furrow at 10 kg/ac), a foliar treatment (75% fertilizer + a foliar spray of AnneMaxx™ Advantage at 3 L/ac and AnneMaxx™ Enhance Plus at 1 L/ac applied at the 5–7 leaf rosette stage), and a combined treatment that incorporated both the granular and foliar applications together with the 75% fertilizer rate.

Emergence, stand establishment, and flowering time were unaffected by any regime. Visual pod development appeared more vigorous in the granular and foliar plots. Single AnneMaxx™ treatments (both liquid and granular) at 75% fertilizer rates produced yields comparable to the 100 % fertilizer control, resulting in an ROI of 9%-122%. The numerical results were remarkably consistent across both locations. Applying AnneMaxx™ Biome (granular) at a 75% fertilization rate increased average yield by 7.3 % compared with the 75% fertilizer control. Combined application of AnneMaxx™ liquid and granular products was ineffective in the over fertilized fields, yielding a negative ROI of 79% to 133%, illustrating diminishing returns when nutrients are already supplied in excess.

Conclusions confirmed that single-product applications of AnneMaxx™ at 75% fertilizer rates can sustain yields comparable to full-rate fertilization and generate profitable returns, whereas simultaneous use of both products in over-fertilized fields is counter-productive.

Recommendations emphasized adopting AnneMaxx™ Biome under appropriately scaled fertilizer programs, lowering target fertilizer rates to realistic, site-specific levels, testing more pronounced fertilizer reductions (e.g., 50% of recommended rates) in future trials, and initially evaluating individual product effects before assessing combinations to improve experimental clarity and decision-making.

**Introduction**

Field trials of Annelida products are required to obtain objective efficacy data that can support sales, marketing, and regulatory submissions. This program comprised small-plot trials on locally important crops, conducted by independent third-party growers in Canada.

**Goal**

To evaluate the impact of AnneMaxx™ products on the yield of canola in Saskatchewan and Manitoba.

**Materials and methods**

The trials were executed by Ag-Quest in accordance with its standard agronomic protocols. The study was planted at two locations on June 5, 2025:

- Saskatoon, SK, GPS coordinates: 52.13475° N, 106.84615° W

The canola variety was CS4100 LL treated with Helix Saltro, Buteo Start and Fortenza. It was seeded at a rate of 7 kg/ha.

- Morden, MB, GPS coordinates: 49.25897, -98.00388

The canola variety L356PC seeded at a rate of 6 kg/ha.

The study includes five treatments:

1. Control – 100% of recommended fertilizers:
    a. Saskatoon, SK: 123-56-42 (N-P-K respectively, lb/ac),
    b. Morden, MB: 108-52-0-40 (N-P-K respectively, lb/ac).
2. Second control – 75% of recommended fertilizers (25% reduction).
3. 75% of recommended fertilizers + AnneMaxx™ Biome applied in furrow at 10 kg/ac.
4. 75% of recommended fertilizers + foliar application of AnneMaxx™ Advantage at 3 l/ac + AnneMaxx™ Enhance Plus at 1l/ac to the total mix of 4l/ac at typical herbicide spraying time (the stage of 5-7 leaf rosette).
5. 75% of recommended fertilizers + AnneMaxx™ Biome applied in furrow at 10 kg/ac + foliar application of AnneMaxx™ Advantage at 3 l/ac + AnneMaxx™ Enhance Plus at 1l/ac to the total mix of 4l/ac at the typical herbicide spraying time (the stage of 5-7 leaf rosette).

In summary, for shortness the treatments were named as follows:

1. Control, 100% fertilizers
2. 75% fertilizers
3. 75% + granular
4. 75% + foliar
5. 75% + both (granular and foliar)

The grower followed the typical growing practices for the area.

The experimental design was a Randomized Complete Block Design (RCBD) with six replications.

The plot size was 4.5 m x 7.5 m, trimmed to 4.5 x 6 m for harvest. Each plot was planted as three separate passes of the seeder of 1.5 m x 7.5 m, i.e., triple wide. Untreated border plots were planted on the sides of the trials to eliminate "edge effect."

**Assessments**

1. Pre-seed and post-harvest (post-harvest samples taken between seed rows) composite 0-6" soil sample across all replicates of each treatment (1-3 cores per replicate x 6 replicates) yielding 5 samples (a composite sample for treatment 1, 2, 3, 4, 5).
2. Early season visual stand (visual rating, 0-100%)
3. Stand count at full emergence (1 m of row from 2 inside rows in the center plot, reported as plant/$m^2$.
4. Phytotoxicity (% visual reduction in biomass compared to untreated control) at 7, 14 days after foliar application.
5. Days to flowering notes, or observations as appropriate if differences are visible.
6. Yields at maturity (each 1.5 m x 6 m subplot harvested and reported separately), reported in kg/ha and bu/ac corrected to standard moisture.
7. Oher notes, measurements, and observations were taken by Annelida.

**Data analysis**

The data were analyzed using an ANOVA (Analysis of Variances) method for RCBD. Treatments and locations were used as fixed factors. The responses were yield and other measurements. The effects of replications were attributed to the error term for the variance. The least-significant-difference (LSD) was computed at $P<0.05$ and is displayed as error bars on the graphs.

Calculations of the return on investment (ROI) were based on the following assumptions: Cost of fertilizers for Canola - $160/ac, Manufacturer's Suggested Retail Price (MSRP) for AnneMaxx™ Advantage at 3 l/ac + AnneMaxx™ Enhance Plus at 1 l/ac - $21/ac, MSRP for AnneMaxx™ Biome - $27/ac, Canola commodity price - $0.62/kg.

**Results and Discussion**

Plant emergence and stand establishment were statistically indistinguishable among all treatments at both the Saskatoon and Morden sites. No treatment altered the percentage of seedlings that survived to the full-season stand. The foliar spray also caused no observable phytotoxicity, and flowering time remained unchanged across the five regimes.

Visual inspection of the pods suggested that development was more vigorous in the plots receiving the 75 % fertilizer level combined with either the granular product or the foliar blend, compared with both the full-rate (100 %) and reduced-fertilizer (75 %) controls (Fig. 1). However, these qualitative observations were not always mirrored by the quantitative yield data.

There were no statistically significant differences in yield (Fig. 2-3) at $P<0.05$; nevertheless, the numerical values remained remarkably consistent across treatments and locations. Consequently, all subsequent analyses were based on “win rate” or consistency and absolute measures of yield.

Reducing the fertilizer rate from 100 % to 75 % (a 25 % reduction) resulted in only a 6 % average yield decline across the two sites, indicating a non-linear response to nutrient input. Post-harvest interviews with the grower revealed that the original fertilizer prescriptions were based on an anticipated yield of roughly 50 bu/ac, whereas the actual average harvest was closer to 35 bu/ac. This discrepancy means the fields were substantially over-fertilized.

Our analysis attributes the modest yield increases observed with the AnneMaxx™ treatments to this over-fertilization. Compared with the 75 % fertilizer control, the 75 % + granular regimen delivered a 7.3 % yield gain, while the 75 % + foliar regimen produced a 4.1 % gain (Fig. 2-3).

The combined granular + foliar treatment, however, gave the lowest yield of all treatments. This outcome is consistent with the expectation that additional nutrients supplied by AnneMaxx™ products become ineffective, or even counter-productive, when the crop is already receiving excess fertilizer.

Economic evaluation showed a positive ROI for the first two AnneMaxx™ treatments because the savings from using 25 % less fertilizer outweighed the product cost (Fig. 4-5). By contrast, the combined granular + foliar treatment generated a negative ROI at both locations; the added expense of applying two products was not compensated by a commensurate yield increase.

Control, 100%

75% fertilizers

75% + granular

75% + foliar

75% + both (granular + foliar)

Figure 1. Visual appearance of the crop by treatments, Saskatoon, SK

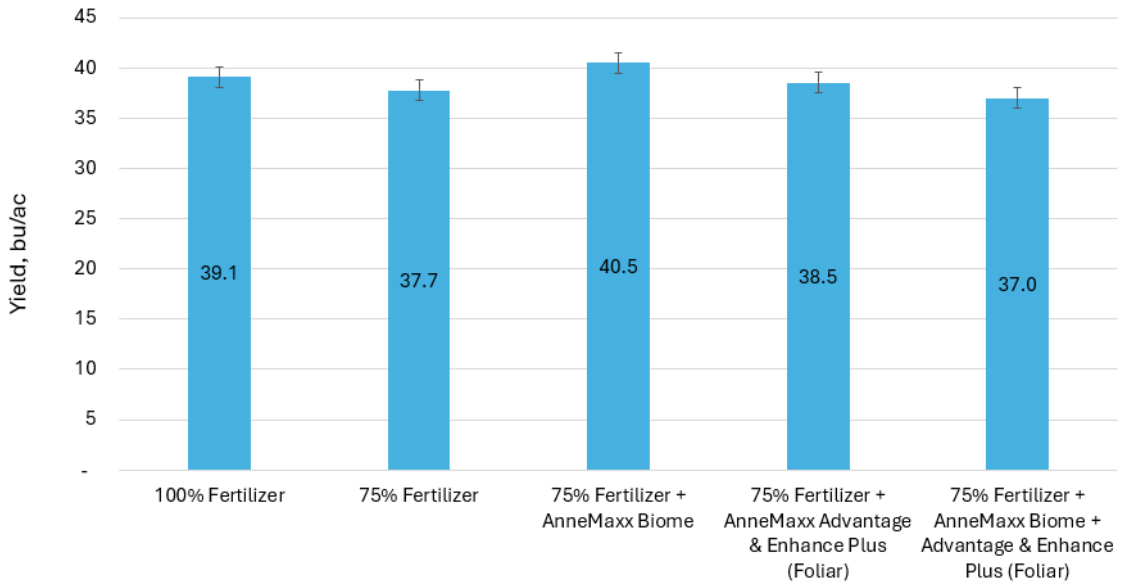


Figure 2. Yield by treatments in Saskatoon, SK

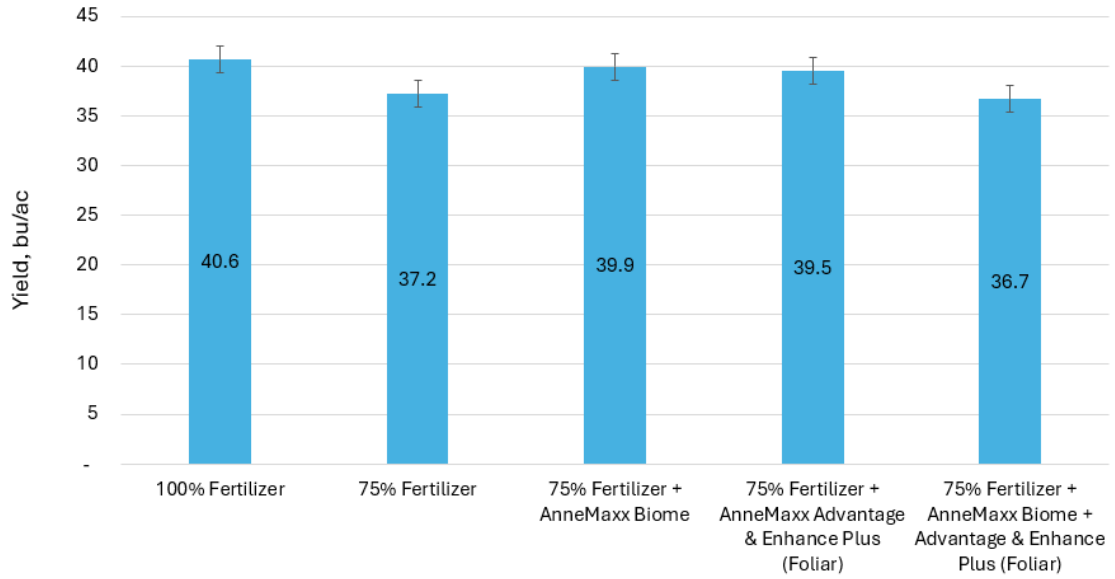


Figure 3. Yield by treatments in Morden, MB

Figure 4. ROI in Saskatoon, SK

| Parameter | 75% Fertilizer + AnneMaxx Biome | 75% Fertilizer + AnneMaxx Advantage & Enhance Plus (Foliar) | 75% Fertilizer + AnneMaxx Biome + Advantage & Enhance Plus (Foliar) |
|---|---|---|---|
| Fertilizer savings, $/ac | 40.00 | 40.00 | 40.00 |
| AnneMaxx cost, $/ac | 27.00 | 21.00 | 48.00 |
| Yield gain, $/ac | 19.97 | -7.71 | -29.73 |
| Savings, $/ac | 32.97 | 11.29 | -37.73 |
| ROI, % | 122% | 54% | -79% |

Figure 5. ROI in Morden, MB

| Parameter | 75% Fertilizer + AnneMaxx Biome | 75% Fertilizer + AnneMaxx Advantage & Enhance Plus (Foliar) | 75% Fertilizer + AnneMaxx Biome + Advantage & Enhance Plus (Foliar) |
|---|---|---|---|
| Fertilizer savings, $/ac | 40.00 | 40.00 | 40.00 |
| AnneMaxx cost, $/ac | 27.00 | 21.00 | 48.00 |
| Yield gain, $/ac | -10.46 | -16.62 | -55.74 |
| Savings, $/ac | 2.54 | 2.38 | -63.74 |
| ROI, % | 9% | 11% | -133% |

The negative ROI was amplified by the depressed canola price, which has been constrained by Chinese sanctions on Canadian exporters [1-3]. Between July and October 2025, the average market price fell by more than 14 % (Fig. 6), reaching $618.25 per tonne on 23 October 2025 [4]. This price drop reduced the revenue side of the ROI equation, turning what might have been a modest profit from the granular or foliar treatments into a loss when the additional cost of the AnneMaxx™ products was taken into account.


Figure 6. Sharp drop in canola prices affecting ROI [4]

Overall, the study confirms that both the AnneMaxx™ granular formulation and the liquid (foliar) product exert a measurable influence on canola performance even when the crop is subjected to relatively high fertilizer inputs. The magnitude of the response, however, suggests that the products could achieve greater efficacy if the baseline fertilization regime were less aggressive. Future experiments might therefore explore more pronounced nutrient reductions, for example, targeting a 50 % fertilizer rate rather than the 75 % rate employed here, to determine whether the benefit–cost ratio improves under lower-input conditions.

The study also underscores a common practice among growers: excessive fertilization. This habit leads to inefficient fertilizer use and diminishes economic returns. Although well recognized within the industry, over-fertilization remains pervasive. Multiple sources collectively illustrate that while many growers instinctively apply more fertilizer to chase higher yields, the practice often inflates input costs, depresses net returns, and can even diminish yields under stress conditions [5-7].

In contract, Annelida Soil Solutions is committed to promoting responsible fertilizer stewardship. By improving nutrient-use efficiency and supporting soil health, the company's portfolio seeks to reduce the reliance on excessive fertilizer applications while maintaining or enhancing crop productivity.

From the research standpoint, although it may seem advantageous to avoid over-fertilized settings in future efficacy trials, evaluating the products under realistic, high-input conditions remains valuable. Over-fertilization is prevalent in contemporary agriculture, and demonstrating product performance across the full spectrum of nutrient regimes reinforces the relevance of AnneMaxx™ for growers who must manage diminishing returns associated with excessive fertilizer use.

**Conclusions**

1. Single AnneMaxx™ treatments (both liquid and granular) at 75 % fertilizer rates produced yields comparable to the 100 % fertilizer control, resulting in an ROI of 9 %-122 %.

2. The numerical results were remarkably consistent across both locations.

3. Applying AnneMaxx™ Biome (granular) at a 75 % fertilization rate increased average yield by 7.3 % compared with the 75 % fertilizer control.

4. Combined application of AnneMaxx™ liquid and granular products was ineffective in the over-fertilized fields, yielding a negative ROI of 79 % to 133 % due to diminishing-return effects.

**Recommendations**

1. Use the AnneMaxx™ Biome granular product at appropriate fertilization levels to boost yield and maximize cost-efficiency.

2. Reduce the target fertilization rate to a realistic level for each growing area in future trials.

3. In over-fertilized environments, employ a more substantial reduction (e.g., a 50 % target, which is a 25 % reduction from the current 75 % rate) instead of the 75 % rate used here.

4. In future trials, first evaluate the effect of individual factors (granular, liquid, foliar applications) before testing their combinations to improve experimental design and enable clearer data interpretation.

**References**


1. China to set preliminary duty on Canadian canola after anti-dumping probe, CBC News, https://www.cbc.ca/news/world/beijing-canada-canola-duties-1.7606557
2. Southwestern Ontario canola farmers brace for impact of Chinese tariffs, CBC News, https://www.cbc.ca/news/canada/london/southwestern-ontario-canola-farmers-brace-for-impact-of-chinese-tariffs-1.7641862
3. Easing Chinese EV tariffs on the table, federal ag minister says, CBC News, https://www.cbc.ca/news/canada/manitoba/china-trade-electric-vehicles-canola-agriculture-minister-1.7629330
4. Trading Economics, Canola prices, https://tradingeconomics.com/commodity/canola
5. Hendricks, G. S., Shukla, S., Roka, F. M., Sishodia, R. P., Obreza, T. A., Hochmuth, G. J., & Colee, J. (2019). Economic and environmental consequences of overfertilization under extreme weather conditions. Journal of Soil and Water Conservation, 74(2), 160–171. https://doi.org/10.2489/jswc.74.2.160
6. Rebecca Dzombak, Excess Fertilizer Causes a New Challenge: Low Crop Yields During Drought, 2021, https://civileats.com/2021/07/21/excess-fertilizer-causes-a-new-challenge-low-crop-yields-during-drought/
7. Hannah Ritchie, Can we reduce fertilizer use without sacrificing food production?, Published online at OurWorldinData.org, 2021, https://ourworldindata.org/reducing-fertilizer-use


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