

RESEARCH SUMMARY

MX-3

biostimulant seed treatment / in-furrow

MONTRA



Research Partnership

Montra Ag is proud to work in collaboration with Dr. Mark Belmonte, PhD, and the University of Manitoba on a multi-year research program focused on advancing the science behind our MX-3 crop technologies. This partnership brings together independent academic expertise and practical agronomic research to better understand how our products perform, how they work within the plant, and how they can be best positioned to deliver value to growers.

Over the course of this collaboration, research has moved from controlled laboratory and greenhouse studies to small plot and field-scale validation. The goal has been clear: generate credible, results-driven data that helps growers apply Montra technologies with greater confidence and better understand the biological and agronomic benefits they can deliver in the field.

Research Leadership

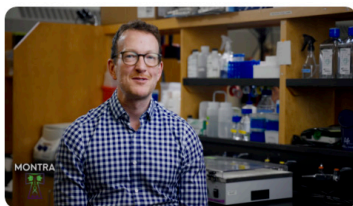
Research is led by Dr. Mark Belmonte, PhD, Principal Investigator at the University of Manitoba, Belmonte Labs.

- 25 years of agricultural experience across the public and private sectors
- 70 publications
- 2 patents



**University
of Manitoba**

This collaboration has also helped support the training of emerging researchers, including graduate and undergraduate students working directly on Montra-related projects.



**Montra MX-3 - Research with
Dr. Mark Belmonte, U of M /
Belmonte Lab**

Please visit us at: <https://bit.ly/mx3crop>
to view our research summary.

What This Research Has Focused On

Montra's research program has been designed to evaluate both product performance and product function across a wide range of agronomic conditions.

Key areas of focus have included:

- Application rates and efficacy of MX-3 Black, and MX-3 Gold
- Root growth, shoot growth, photosynthesis, and soybean nodulation
- Seed treatment, in-furrow, and foliar application timing across corn, soybean, canola, and wheat
- Crop resilience under cold weather and drought stress
- Mode of action research, including what MX-3 is doing within the plant and what biological pathways may be activated
- Greenhouse, small plot, and field trials
- Nutrient uptake, nutrient availability, and plant utilization
- Soil health, including bacterial and fungal DNA sequencing to better understand support for beneficial organisms
- Evaluation of MX-3 on solid zeolite granules for solid application systems

How We Evaluate Product Performance

Our research approach is built to test products from multiple angles, moving from scientific understanding to practical field validation.

Greenhouse Research

- Product rate screening
- Application timing studies
- Root and shoot response
- Early crop performance under controlled conditions

Laboratory Research

- Mode of action
- Gene expression
- Photosynthesis
- Nutrient analysis
- Plant and soil response mechanisms

Field Validation

- Replicated small plot trials
- On-farm trials
- Commercial relevance under real growing conditions

Results-Driven Product Insights

The purpose of this work is not simply to collect data, but to identify how each product can create measurable value for growers.

MX3-Black

Research has shown MX3-Black performs best when applied as a seed treatment or in-furrow, where it helps drive stronger root development and improve crop establishment in cold soils. Positioned directly in the root zone, MX3-Black helps unlock tied-up nutrients in the soil, chelate them into a more plant-available form, and improve early nutrient access when seedlings need it most. In-furrow placement may also help support beneficial soil biology around the seed and root interface, contributing to a healthier rhizosphere and a stronger early-season growing environment. The result is a product strategy designed to reduce cold stress response, improve early vigor, and set the crop up for stronger performance from emergence onward.

MX3-Gold

Research has shown MX3-Gold performs best when applied at herbicide and fungicide timing, where it integrates easily into a standard crop protection pass while delivering added biological value to the crop. At this stage, MX3-Gold helps drive root growth, improve nutrient uptake and nutrient use efficiency, and support stronger photosynthetic activity during a critical period of crop development. Research has demonstrated improvements in uptake of key nutrients including N, P, Zn, and Mo, helping plants make better use of available fertility and direct more energy toward growth and reproduction. By improving plant efficiency and supporting performance during periods of high demand, MX3-Gold helps growers maximize crop vigor, resilience, and overall yield potential. Additional Montra trial materials also report improvements in soybean root development and biomass, soybean nodulation and yield, and increased corn nutrition levels under trial conditions.

Root & shoot growth • Nutrient uptake • Photosynthesis • Yield potential

Additional Montra research materials note improvements in soybean root development and biomass, soybean yield and nodulation, and increased corn nutrition levels under trial conditions.

Why This Matters for Growers

This long-term collaboration helps ensure Montra products are backed by more than claims alone. By combining academic research, controlled environment testing, and field validation, Montra is building a stronger understanding of where our technologies fit, how they should be applied, and what benefits growers can expect. The result is a research-backed product platform designed to support stronger roots, improved nutrient efficiency, better stress tolerance, and higher performance potential in the field.

"Our collaboration with the University of Manitoba is focused on generating practical, science-based insights that help growers apply Montra technologies with confidence."