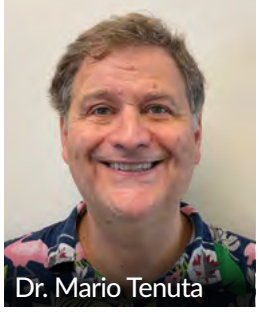
BALANCING ENVIRONMENT AND ECONOMICS

Research Chair focuses on 4R Nutrient Stewardship

Dr. Mario Tenuta sees all the opportunities that come with reducing greenhouse gas emissions (GHG) associated with crop production in Western Canada.


Dr. Mario Tenuta

Lowering the environmental footprint is obvious, but he's also looking at ways to address the growing green expectations in the global grain marketplace.

Tenuta – a soil science professor in the Faculty of Agricultural and Food Sciences at the University of Manitoba (U of M) – is part way into a five-year position as the Natural Sciences and Engineering Research Council of Canada (NSERC) Industrial Research Chair in 4R Nutrient Stewardship. The title is a mouthful, but the goal of his program is simple – how 4R farming practices can reduce GHG emissions from soil. The $2.9 million program is focused on field-level, on-farm trials to determine the best combination of 4R elements – right fertilizer, right rate, right time, right place – to recommend to farmers to balance crop production and productivity while reducing GHG emissions.

"Fertilizer nitrogen represents the highest operating cost in field crop production in Canada," says Tenuta. "Our research and outreach will provide practical and

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feasible ways to improve crop productivity and reduce direct and indirect emissions of nitrous oxide and nitrate leaching. This will help Canadian farmers continue to be leaders in the export of sustainably produced, high-quality food to much of the world."

Focusing on nitrous oxide

Tenuta's work is zeroing in on nitrous oxide. It's a greenhouse gas that's released from soil into the atmosphere whenever nitrogen cycles through soil. "We're looking at 4R practices that will limit the release of nitrous oxide directly from crop soil, as well as the indirect release that comes from ammonia and nitrate," he says.

Existing research already provides some options for reducing nitrous oxide emissions, from the use of nitrification inhibitors added to fertilizer to slow down the transformation of ammonium to nitrate, and practices to protect nitrogen from losses such as subsurface banding.

Delivering realistic, farm-level results

When it comes to developing on-farm recommendations, Tenuta knows it's critical to balance agronomic expectations with the bottom line impact to the farmer. "We always consider practices for a sustainable production system that a farmer can actually use in their operation. I call it practical, field-based, grower-centric research," he says.

Tenuta and his team have purposely chosen to conduct experiments on farm fields with cooperating farmers. "We always find it better to work in farmers' fields to provide the most realistic soil conditions to study nitrogen responses and emissions as we vary the 4R elements," says Tenuta.

They'll be studying effectiveness of nitrification inhibitors with certain types of fertilizers, especially anhydrous ammonia – the most common fertilizer in Western Canada, and particularly Manitoba where it is applied in the fall. "We are doing field trials looking at how to protect nitrogen in the fall so it's not emitted as nitrous oxide in the spring and that farmers don't need to compensate rates for over-winter losses."

Another aspect of Tenuta's work is a closer look at monitoring leaching and ammonia losses, which are not well understood for Western Canada. "We'll see how the 4R practices and combination of practices can reduce those losses, and how that impacts reducing nitrous oxide emissions," he says.

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Strengthening Canadian agriculture

The Industrial Research Chair position represents a unique opportunity for Tenuta and a high priority for U of M to provide resources and capacity for research, graduate teaching, extension and outreach. They've purchased world-class instrumentation to use with on-farm trials, and their work will drive more sustainable solutions for crop production. "The work we are doing will help preserve our major export markets because we are reducing emissions and the overall footprint of western Canadian crop production," says Tenuta. "We'll be strengthening Canada's role as an active participant in creating solutions for a global issue."

Partnership powers new research

Tenuta's role is supported, in part, by the Western Grains Research Foundation (WGRF). "We are excited about the potential impact this research can have for farmers," says WGRF Executive Director Garth Patterson. "We have made it a priority to increase the agronomic research capacity in Western Canada through a number of strategic investments, including this role for Dr. Tenuta." The five-year position was awarded to Tenuta in partnership with NSERC, WGRF, Fertilizer Canada and U of M.