Managing nitrogen fertilizer gains industry-wide attention

Renfrew area farmer Jennifer Doelman soil samples wheat on-farm

Doelman, who farms grains, oilseeds and perennial forages, is seen spreading organic fertilizer

Policy makers, environmentalists, scientists and farmers weigh in

BY CLEO DING
Project J, Ontario Farmer

Family farms across the country are mixing modern practices and traditional agronomics in order to remain sustainable and thrive in a changing agricultural landscape.

This is especially true when it comes to the management of nitrogen fertilizers, which has gained a lot of attention recently from federal policymakers, as well as environmentalists, scientists, and farmers.

Jennifer Doelman, who represents Arnprior, Lanark, Ottawa, and Renfrew at the Ontario Federation of Agriculture, has been outspoken about the need to change the tone in the conver-sation between the Federal Government and farmers, specifically around the goals for reducing nitrogen fertilizer emissions.

"The unintended consequence of these government targets is that they don't provide an accurate picture of what farmers have already done," said Doelman. "Many of us have already decreased nitrogen fertilizer use as part of our implemented best practices."

Doelman runs a first-generation farm. Along with being a beekeeper, she also farms grains, oilseeds and perennial forages near Douglas, west of Renfrew with her husband, Michael.

The Doelmans were both born in farming families but started fresh with their own farmland in the Upper Ottawa Valley.

This region is known for its diversity of soils. It was once at the bottom of the Champlain Sea, whose rich sediment deposits became fertile soils.

Glacial activity scoured the area and much of the topsoil in higher elevations was removed, exposing the bedrock, which became known as the Canadian Shield.

Between fields of corn, wheat, and soybeans, there are parts of the region that have more fragile soil systems that are better suited to pasture or forestry. Because of this, Doelman says the Ottawa Valley has a unique blend of livestock, animal, grains, and oilseeds.

Fertilizer use in Ontario: It's always changing

According to Doelman, the emissions conversation has been overtly politicized because the Federal Government is measuring on-farm nitrogen emissions based on national fertilizer sale volumes.

"That's kind of like saying we can measure food waste by how much food the main grocery store chains sell. It undermines and devalues the actual work being done by folks after that point to solve the problem," Doelman said.

Doelman emphasized that farmers are working with living ecosystems, which makes quantifying the nitrogen needed for crops a constantly moving target. On top of that, many factors are determined by weather patterns after planting.

Fertilizer is only part of the nitrogen emission conversation, the farmer said. It's also about managing nutrient availability so it coincides with the needs of the crop.

"You can have a very similar crop rotation three years in a row with similar management and have very different nitrogen emissions each year. It all comes down to how the volume and timing of rainfall and temperature impact the soil," Doelman said.

The science of nitrogen

As to why the science of nitrogen is hitting its heyday now, experts say people are finally getting the message that climate change is going to be a problem.

Finding ways to reduce greenhouse gas emissions, which includes nitrous oxide, methane, and carbon dioxide has become a priority.

Andrew VanderZaag is a research scientist based at the Central Experimental Farm in Ottawa who has specialized in nitrogen emissions for 15-years.

According to VanderZaag, nitrous oxide is a greenhouse gas that's emitted as a very small byproduct of nitrogen cycling and doesn't always occur.

"A lot of the emissions that we're talking about are complex biological processes and we want these processes to happen," said VanderZaag.

"There's a lot of factors involved. It's usually not as straightforward because the soil is different. From farm to farm, from region to region, there are interactions with weather and crops and everything."

Maria DeRosa, a chemistry professor at Carleton University in Ottawa, agrees on the importance of nitrogen. Her research involves special coatings for fertilizers that protect them from being wasted, and allow them to respond better to crops.

"There's nothing inherently wrong with nitrogen. Problems come when that element is somewhere where it doesn't belong, or where there's already too much of it," DeRosa said.

She explains that nitrogen is good in the soil and helps plants grow.

At the same time, it can cause toxic algae to bloom when it's washed off into waterways. In the air, it can also end up being a greenhouse gas contributing to climate change and creating pollution problems such as smog.

Surging fertilizer prices hit farms hard

Fertility has always been one of the biggest inputs for farmers. Even organic farmers still need to supply nutrients to their crops in some form.

Farm Credit Canada data show that nitrogen fertilizer prices rose 148 per cent from $550 per tonne in 2020-21 to $1,365 per tonne in 2022-23.

With the price of fertilizer increasing, farmers are already sensitive to the need to stretch their fertility budget. With this in mind, Doelman said there is some resistance to changing practices in her neck of the woods.

"We only get paid when we deliver our crops to market. We don't get paid for good intentions, and we certainly don't get paid for changing practices that reduce our yields," Doelman said.

Many farmers simply don't have the means to alter their system. And even if affordability isn't an issue, under-serviced areas often don't have access to agronomists, full-service retail businesses, or custom operators who can help implement practices like variable rate nutrient application.

Scientists and farmers working together

In the last decades, Canadian farmers have become more efficient and productive and have shown progress in reducing emissions per unit of product by 27 per cent to the 2005 level.

There are great joint efforts made between farmers and scientists behind the hopeful numbers.

"The improvement of efficiency and productivity is now being connected also to the challenge of nitrogen use efficiency," VanderZaag said.

"There's never going to be perfect information in advance about what the weather's gonna be, so it's hard for the farmers. It's a challenging thing to reduce emissions."

Despite the challenges, chemist DeRosa thinks farmers are ready for the change. And with

For the second year running, Ontario Farmer has partnered with Carleton University to participate in a journalism contest being run in conjunction with its School of Journalism and Communication.

Project J, as it is called, connects Ontario Farmer with students who have written and submitted original pieces focused on farming, agriculture and agri-food.

Reviewed by agricultural journalist and editor Courtney Denard, this year's piece was written by Cleo Ding.

Ding is a recent graduate from Carleton's Bachelor of Journalism program. She was born and raised in China and undertook international news reporting training in Europe where she worked as a multimedia foreign correspondent.

Currently, Ding is an Ottawa-based freelance journalist with a focus on the changing cli-mate's impact on humanity.

Cleo Ding

growing public interest in this matter, it's a perfect moment for scientists to use technology to help.

"When I started my research… we weren't thinking about agriculture as a place where we would be doing these kinds of experiments. We weren't thinking about agriculture as a place to innovate and it's only because of our ignorance," DeRosa said.

Now, scientists know there is a lot that can be done in agriculture and that big changes are possible.

An opportunity for on-farm nutrient management

Back on the farm, Doelman said she has been striving to reduce her environmental footprint since she started farming and it's discouraging that policymakers don't acknowledge the work done by innovators or early adopters that have helped develop environmentally beneficial practices.

Like many of her farming peers, Doelman participates in the 4R Nutrient Stewardship program, which promotes the achievement of economic, social, and environmental goals by applying the right source at the right rate, right time, and right place.

"If we adopt a practice before the government policy 'qualifies' it, not only are we not recognized for it, our slower-to-adapt peers are then able to access funding to make the changes we have borne on our own, rather than reward innovation and good stewardship," Doelman said.

That being said, the farmer thinks it's wonderful that people, including consumers, are listening and paying attention to where their food comes from again.

"It's an exciting time because it's created an opportunity for research and investment in on-farm nutrient management," she said.

The Living Labs Initiative with Agriculture and Agri-Food Canada also brings optimism because it links farmers, scientists, and other collaborators to co-develop and test innovative practices and technologies to address agri-environmental issues.

"Now we have different tools that we can use, we can better predict when our crops will need nitrogen fertilizer additions, which has the potential to improve our profitability as well as lessen our environmental impact," Doelman said.

Torpedo styling best expressed by Pontiac

So named for its windswept, rounded shape, the torpedo look was copied by other automakers

BY PETER EPP
The writer is a veteran journalist based in Chatham

This 1942 Pontiac Torpedo Eight was on display in Chatham in 2014 as part of Retrofest. The two-door coupe is mostly original, and its owner says it was built in early 1942, just before Detroit-based automobile production was curtailed because of the war effort

Designer Bill Mitchell was able to expand the mid-section of the car, making the body wider by about five inches

General Motors introduced its first new post-war cars for the 1949 model year. From 1945 to 1948, the corporation improved upon designs introduced in the years immediately prior to the Second World War.

This wasn't a bad thing. Most of the cars produced by the Detroit-based auto companies from 1940 to 1942 were attractive and cutting edge, featuring the latest technology and gadgetry.

Moreover, a lack of automotive production from early 1942 until the middle of 1945 meant there was a pent-up demand for new cars in the years immediately following the war. Anything Detroit built between 1945 and 1948 was snapped up.

The era's signature design from 1940 to 1948 was the torpedo-shaped car, as styled by General Motors. So named because of its windswept, rounded shape, the torpedo look was copied by other automakers but never presented as successfully as it was by GM.

Bill Mitchell, a GM stylist for over 40 years, was mostly responsible for the new look. Mitchell joined GM in late 1935, working on designs for Cadillac, LaSalle and Buick. His superiors were impressed with his work, as Mitchell was only 26 when he was promoted to chief stylist for Cadillac.

His first challenge was to supervise the design for the 1938 Sixty Special, a smaller Cadillac. Mitchell's design was radical, as the Sixty Special featured a distinct shape for the upper and lower body, as well as an outline of what would become the modern trunk.

Mitchell's Sixty Special also featured convertible-type glass frames, and the absence of a running board. This was radical; running boards had been a staple of the auto industry, a visual reminder of its turn-of-the-century horse-and-buggy roots.

But there was little need for them by the late 1930s. And by eliminating the running board, Mitchell was able to expand the mid-section of the car, making the body wider by about five inches.

Needless to say, the Sixty Special was a sensation, and its major design theme was adopted by GM for the 1940 model year. Running boards disappeared and all of GM's cars became more rounded and streamlined.

GM called Mitchell's work The Torpedo Look, and its Pontiac division used the Torpedo name for one of its models, built until 1948.

The Pontiac Torpedo was a thoroughly modern car when introduced in late 1939. Sharing the same body with the Cadillac Series 62, Buick Roadmaster and Oldsmobile Series 90, the full-size Pontiac was not only five inches wider than the previous model, but almost three inches lower.

When combined with a column-mounted shifter, it offered six-passenger comfort - an industry paradigm that would exist well until the 1990s in the full-size cars being offered by the Detroit-based car companies.

But there was more to the Torpedo. It also featured larger windows, and the door hinges were concealed for the very first time. Overall, the design made for a sleek and distinctive look.

The 1940 Pontiac Torpedo was available only with Pontiac's inline eight-cylinder engine, advertised as the Silver Streak.

The car was available with a variety of configurations that basically broke down into a four-door sedan, two-door sedan or convertible. Within those variations, however, was a two-door businessman's coupe, a club coupe, four-door six-window sedan, and a four-door, four-window "Metropolitan" sedan.

Torpedo owners had several options to choose from, including a heater, cigarette lighter, six-tube radio, electric clock and a light for the trunk.

The exterior was generously draped with distinctive chrome ribbing on the hood and trunk. The hood ornament had a plastic 'Chief Pontiac' head mounted within a metal base.

For 1941, Pontiac's entire lineup was named Torpedo, with a low-end Deluxe Torpedo, a midpriced Streamliner and the more expensive Custom Torpedo. The Deluxe was fitted on the small A-body (119-inch wheelbase), while the Streamliner and Custom Torpedo were fitted on the larger 122-inch B-body. Both six and eight-cylinder engines were available.

The Steamliner featured fastback styling, for which the torpedo design is best remembered, while the more expensive Custom had notchback styling, which was more in keeping with the original Mitchell design from 1938.

Visitors to Chatham's Retrofest event and car show in 2014 were treated to the appearance of a rare 1942 Torpedo, a two-door coupe said to be in original condition.

The car is fitted with Pontiac's straight eight-cylinder engine, weighs 3,265 pounds and, when new, cost $940 to purchase in American funds.

The car was built at Pontiac, Michigan but remains a rarity because the production schedule for the model year was curtailed in early February 1942. Because of the abundance of chrome, it can be assumed this particular Torpedo was built before Dec. 7, 1941, when Pearl Harbor was attacked by the Japanese.

Following that event, some resources, such as the nickel for brightwork, became difficult for the Detroit-based auto companies to secure.

As with the original 1940 Pontiac Torpedo, the '42 model features a plastic Indian head encased in a chrome base. Below that is a much larger bullet-shaped emblem containing the Pontiac script and a profile of Chief Pontiac, overtop of what appears to be an arrowhead.

The '42 Torpedo features a new grille, which would become the basis for the Pontiac style until the new cars were rolled out for 1949.

It would be a mistake to leave the impression that only Pontiac featured torpedo styling. It was also used by GM's other divisions. But only Pontiac used the Torpedo name for its model.

When GM introduced its new line-up for 1949, Bill Mitchell's original vision from 1938 resurfaced but with softened aerodynamics. Although handsome, the new '49 models from GM were rather pedestrian-looking (in this writer's opinion) compared to the previous era.

And the new Pontiacs lacked the carefree flamboyance they had enjoyed as 'torpedo' cars.

As for Mitchell, he succeeded chief stylist Harley Earl in 1954 and headed up GM's style team until his own retirement in 1977. While Earl loved chrome, fins and was mostly responsible for the sometimes-gaudy shapes that GM rolled out in the Fifties, Mitchell preferred less chrome and sharper edges.

He was responsible for the shape of the beautiful 1963 Riveria, the 1966 Toronado, and the 1967 Camaro. His influence also found expression on the original Cadillac Seville. He died in 1988.