

by MARY BAXTER

John Lauzon

Exploring ways to improve the availability of while following sound conservation

Research is demonstrating that combining conservation techniques with manure applications can achieve corn yields equivalent to conventional tillage and inorganic fertilizer combinations

Agriculture and Agri-Food Canada (AAFC) and University of Guelph researchers are exploring ways to apply liquid manure to create the least amount of environmental impact.

For Dr. Bonnie Ball-Coelho, a research scientist with AAFC, the focus over the past five years has been on how to combine manure applications with minimum till. She and her team have found that combining conservation techniques with manure applications is not only possible but can also achieve corn yields equivalent to conventional tillage and inorganic fertilizer combinations.

"What we started doing was looking at zone tillage for minimum till," says Dr. Ball-Coelho, explaining that the study initially compared fall and spring manure applications.

With the recognition that fall applications resulted in a significant nutrient loss, researchers switched in 2003 to comparing spring applications with split applications, where one took place in spring before planting and the other as a side dress after the crop was in the ground.

Now, with three years of data under their belt, they're beginning to see that there are different considerations to keep in mind, depending on which strategy is chosen.

You really have to keep an eye on application rates and nitrogen levels if applying solely in the spring, says Dr. Ball-Coelho, noting that too high a concentration of N applied at too great a rate will set corn growth back. A safe amount is between 200 to 250 kilograms per hectare, depending on the time delay between manure application and planting.

What type of equipment you use can also make a difference with the spring application, she adds. The tine type of tilling system used in the studies resulted in less of a negative impact on growth or germination when the manure was highly concentrated than the two other knife-type systems used.

Dr. John Lauzon, assistant professor of soil management and fertility with the University of Guelph's department of land resource science, has also been involved in the project. In one two-year study he and his team tracked the loss of ammonium nitrogen following an application of liquid hog manure and measured how much of the nitrogen ended up in the next year's crop.

In the study, applications were made in late summer, early fall and again in the spring. The results were consistent and "much as one anticipates," he says. Manure applied in late summer had very little nitrogen available in the next summer's crop.

The researchers also found that the amount of time which elapses between the surface application of nitrogen and its incorporation into soil will affect how much is retained over the long term.

Dr. Lauzon explains that most of the nitrogen loss occurred on the first day because of volatilization (a form of evaporation) and as much as half of it could be lost through this process. Manure incorporated after five days showed a similar nitrogen loss to manure that had been left on the surface.

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RACHEL LINCOLN

Bonnie Ball-Coelho

For Agriculture and Agri-Food Canada (AAFC) researcher Dr. Bonnie Ball-Coelho, agriculture, and in particular agriculture in Ontario's southwest region, has been a lifelong interest.

Ball-Coelho grew up on a cash crop farm in the Aylmer area. She holds a BA and M.Sc. from the University of Guelph as well as a PhD from the University of Saskatchewan. Her doctoral work involved the study of sugar cane crops in Brazil.

After graduation, she became involved in agribusiness before joining AAFC in 1993. There, she worked at the government research station in Delhi for five years and then moved to London, where she is currently stationed.

The focus of Ball-Coelho's work in recent years has been on the management and the environmental impact of nutrients. "The basic idea," she says, "is to get the nutrients into the crop and not have them moving into the environment, so how we do that – that's what we work on."

Along with looking at the impact of nutrients on corn, she has focused on wheat (she is currently involved in a study concerning top-dressing wheat) and has also done some work with ginseng.

Ball-Coelho is also becoming interested in biofuel crops and has discovered a renewed significance for her interest in sugar cane. "Sugar cane is the model for ethanol production in terms of efficiency," she says, noting that exploration of the possibility of planting a relative of the fuel-producing plant, miscanthus, here in Ontario, is also taking place. Researchers from Agriculture Environment Renewal Canada (AERC) have developed millet and sorghum lines which are adapted to Ontario conditions, she says.

She's also looked at rotation systems for nematode control with sorghum and millet. "AERC has identified some sweet lines there that could be crushed and similarly to sugar cane, be converted to ethanol," she observes.

Along with surface applications, other methods of application were studied, including deep and shallow injection. Injection systems revealed the least amount of nitrogen loss.

Dr. Lauzon is now comparing retention of nutrients and losses of bacteria from different application methods.

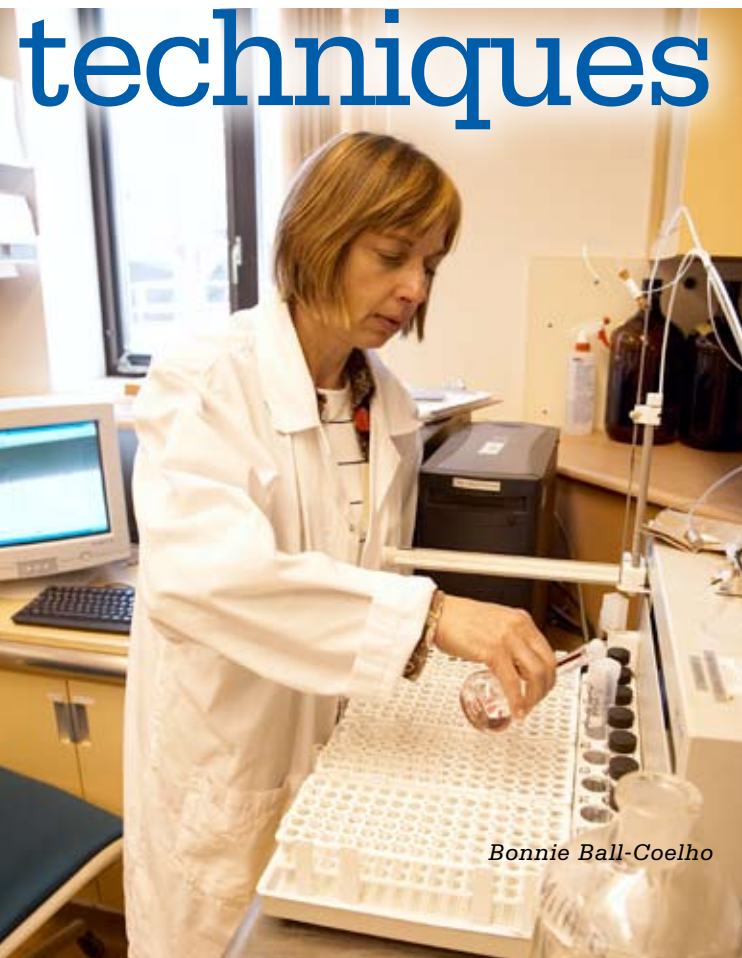
The study, launched last year, looks at the losses from manure applied using five different approaches to application, ranging from surface-only to combinations of tillage and surface applications.

Trials took place at the university's Elora research station and Ridgetown campus and plans are to repeat them again this year. The studies are also looking at the nitrogen, phosphorus and bacteria content of the flows.

"The main push of these studies is to improve the agronomic availability of nutrients – improve the bottom line for the farmer – and keep nutrients and bacteria from places we don't want them to be," says Dr. Lauzon. He plans to have a detailed report ready by fall.

nutrients

techniques



Bonnie Ball-Coelho