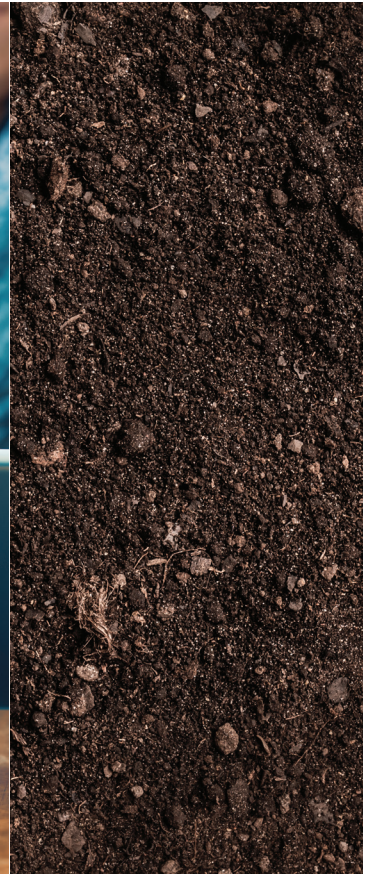


BREAKING NEW GROUND

**MEET FOUR POST-GRADUATE STUDENTS WHO ARE
WORKING TO MAKE MANITOBA STRONGER**

By Joel Schlesinger



What do worms, canola, iPads and groceries have in common?

They're all the focus of important research going on at Manitoba universities that could have economic, social, environmental, and health benefits for Manitobans. Moreover, they're all supported financially by Research Manitoba, the provincial government's funding arm for

innovation and research.

This kind of support is incredibly important for graduate and post-graduate students involved in research, says Dr. Toby Martin, a professor at the University of Manitoba, and supervisor of one of the researchers.

"Research Manitoba funding

allows students to focus on their research without having to worry about working a part-time job on the side, which ultimately would end up dragging out their research program longer than it should," he says. "Basically, it offers students the freedom and independence to focus on research and develop the

experience that will allow them to embark on successful careers."

The four stories that appear on the following pages of this special report provide a glimpse into some of the work being carried out by students with the support from Research Manitoba.

CANOLA'S PROTEIN POTENTIAL

RESEARCHER EXPLORES EXPANDING VALUE OF ONE OF CANADA'S TOP CROPS IN GLOBAL FOOD CHAIN

By Joel Schlesinger

Canola is already one of Canada's most important agricultural crops, worth an estimated \$20 billion a year in economic activity. But researcher Ashley Ammeter wants to make it even more important to Canada, as well as to the global food chain.

The master's student in plant science at the University of Manitoba's Faculty of Agricultural and Food Sciences is hoping to help make canola a nutritional powerhouse by figuring out a way to improve its protein characteristics.

As Ammeter explains, soy bean meal is currently the main source of plant-based protein for human consumption around the world, and is used in a variety of foods, from pasta to cereal to meat products. By comparison, canola is used to make cooking oil and feed for livestock.

Canola's potential can be found in two important proteins – cruciferin and napin – which could be enhanced to boost the plant's overall protein levels and be tailored for specialized uses.

A number of companies are already working towards developing canola into an additive that could be utilized in a variety of food products.

This is where Ammeter's research comes into play.

She's examining the potential to increase the content of cruciferin and napin in canola through breeding and genetics.

"If specialty meal types could be developed, the value of canola meal could be increased multiple times," says Dr. Rob Duncan, assistant professor of plant science and Ammeter's supervisor.

And that's why Ammeter's work could prove so valuable.

Canola meal content already contains about 60 per cent cruciferin and 20 per cent napin.



Ashley Ammeter with canola plants in a greenhouse at the U of M.

If their levels can be modified, extraction efficiency could be improved. However, the degree to which the levels of cruciferin and napin can be modified remains largely unknown.

"The goal would be to find out what the current range in levels is and then try to move higher levels into commercially viable genotypes."

Ammeter's research will do just that.

"My work is looking at the genetic control of these two proteins, and how the environment and the genes interact with one another to affect the content of cruciferin and napin," she says.

Ammeter is also examining how hybridization – the process of crossing different plants –

may help augment the protein content of canola.

"Hybrid vigour is a phenomenon that occurs when you take two different parents and cross them. In many cases, the offspring could outperform those two parents," she says.

To date, there has been significant breeding effort directed to canola, but much of that work is rooted in a desire to increase the amount of oil in the plant's seed, which inversely reduces the level of protein in the canola meal, she says.

Ammeter's work is part of a larger body of research being carried out in collaboration with a team from Agriculture and Agri-Food Canada that includes Drs. Sally Vail, Isobel Parkin, Dwayne Hegedus and Janitha





Wanasundara.

These scientists have worked closely with Ammeter's supervisor Duncan to study the genetic traits of canola.

This type of research is extremely important, says Duncan. As the population grows, the world will need even more sources of plant-based protein, as it is unlikely that animal sources can keep pace without high cost and potential environmental concerns.

"The Food and Agriculture Organization of the United Nations has recognized the need for more plant-based protein sources," says Duncan. "One of the main reasons I started down this research path was that so many people around the world do not meet

the necessary daily protein intake requirements."

One of the interesting things about Ammeter's work is that it delves into a previously unexplored genetic aspect of canola. While napin and cruciferin are not new discoveries, little has been done to understand how they can be exploited to make canola even more valuable to farmers.

"From the point of view of a producer, if there's going to be a market for canola protein for humans, there would need to be more value embedded in that crop – like higher protein content – so farmers could potentially earn more from a field of canola compared with what they can now," she says.

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FOOD FOR THOUGHT

GROCERY STORE STUDY WILL PROVIDE PLANNERS WITH KEY DEMOGRAPHIC INFORMATION

By Joel Schlesinger

Larissa Blumenschein has spent a lot of time in downtown corner stores and other places where groceries are sold.

Yet it's not because she lives downtown and needs a bite to eat. Rather, the master's student of city planning at the University of Manitoba's Faculty of Architecture has an interest in how the built environment of a neighbourhood may affect how residents shop for affordable, healthy foods like fresh vegetables and fruits.

As she explains, there has long been a concern that Winnipeg's downtown is a virtual food desert, lacking in grocery shopping options and larger stores that tend to offer the best prices.

This is a potential problem because lack of access to fresh, affordable food, especially for lower-income households, has been linked to a higher prevalence of heart disease, obesity and diabetes.

Blumenschein wanted to test this notion by getting the lay of the land, finding out what kind of options residents indeed have in downtown and how they shop for groceries.

Although her study is not yet complete, the early findings are interesting.

"So far, I was surprised to find how much choice there is downtown for food at corner stores and small grocery stores," she says. "There's almost a

misconception that there are not enough options for food."

Yet while options do exist, they don't satisfy everyone's needs. A survey of downtown residents indicated that while some can get by shopping for food downtown, others said they needed to go to the larger stores in the suburbs for their groceries. And there are also barriers.

Of particular concern were individuals with mobility issues – such as seniors – who struggled to get access to fresh, affordable groceries, downtown or otherwise.

Clearly, the data being gathered by Blumenschein will be helpful in better understanding the shopping patterns of downtown residents today and the barriers they may face in their quest for fresh, affordable groceries. But it will also be an important guide for planners and developers going forward, according to Orly Linovski, an assistant professor at the U of M and Blumenschein's research supervisor.

"Food deserts usually refer to low-income and other marginalized communities, but Larissa's focus has a broader perspective," says Linovski.

With the trend toward more residential development downtown, it will be increasingly vital for municipal governments



Larissa Blumenschein is studying grocery shopping patterns.

to ensure there are enough services – including affordable groceries – accessible to everyone. In order to do that, governments need data.

"The main reason I'm looking for responses from those living downtown right now is to bring to light the issues and barriers they face, rather than looking at a specific group of people who have yet to live there," Blumenschein says. "But the work may have big implications for those who do want to live

there in the future, especially with all the development going on downtown right now."

With the information now gathered, Blumenschein's next step is analyzing and organizing the data so it can serve as a helpful guide for city planners and other stakeholders.

"Through this research, I am hoping to be able to come up with information policymakers could use when thinking about building healthy downtown communities," she says.



AS THE WORM TURNS

DOES THE HUMBLE NEMATODE HOLD THE KEY TO UNDERSTANDING EARTH'S ECOSYSTEMS?

By Joel Schlesinger

You've probably never heard of a nematode, much less seen one with the naked eye.

But this microscopic worm, abundantly found in soil, could prove pivotal one day in better understanding the effects of climate change on the prairies, says Victory Coffey, a graduate student in the University of Winnipeg's Bioscience, Technology and Public Policy program.

That's because the nematode is one of the most plentiful multicellular organisms on the planet, and is often a key indicator as to the health of the soil it inhabits.

To better understand the connection between nematodes and soil health, Coffey is studying the restoration of prairie fescue grassland near Lake Audy in Riding Mountain National Park.

As she explains, that piece of fescue grass prairie was converted to a large spruce plantation in 1930 and then back again in 1997.

"Parks Canada realized eventually that this (the original conversion) was a mistake because of all the problems associated with white spruce, so they decided to remove the grove and restore the original fescue prairie," says Coffey.

As part of her research, Coffey is examining which plants have returned to the land, and studying the soil and the diversity of nematode worms as an indicator of ecosystem health.

"The larger question here is that this (the tree plantation) was an initiative to transform prairie into a forest, and that's a model for how climate change

can impact the prairie," says Dr. Rafael Otfinowski, an assistant professor at the U of W and Coffey's research supervisor.

As the climate changes, warmer weather will likely favour invasive species such as Kentucky blue grass as well as varieties of trees in forested areas that border prairie grassland. As a consequence, the native plants of the fescue prairie – an important natural habitat for many animals, as well as livestock – could eventually be forced out and disappear. These new plant species may also change the very chemistry of the soil, impeding efforts to conserve and restore fescue grasslands.

Nematodes could prove pivotal to understanding the potential impact, as certain species of the organism exist in conjunction with specific plants and soil conditions. As such, they offer clues about the soil health of the prairie. In fact, Coffey suspects the presence of some worm types may be necessary for native grasses to grow, while others – associated with invasive plants – may actually inhibit restoration efforts.

The grassland project in Riding Mountain is unique in that it provides a window to the future impacts of encroaching non-native species on the prairies.

"In this case, by removing the trees as Parks Canada has done, we have an opportunity to see what the lasting effects are of a forest on a prairie, and whether it's possible to restore prairie after trees have actually

encroached upon it," she says.

Plains rough fescue – a species of grass tolerant to extreme cold, which makes it an important food source for wildlife in the winter – is already under threat.

"Less than five per cent of the original fescue prairie remains in Canada," Coffey says, adding that agricultural and other human activities have largely led to its disappearance. "Aside from human land use, climate change is also a huge factor because as temperatures change and natural disturbance regimes change – like fires – trees then take the opportunity to spread

into areas where they previously would not have grown."

And make no mistake: preserving what's left of the natural prairie is vital in the fight against climate change because fescue grass and other native species absorb large amounts of carbon dioxide in their extensive roots. As a result, efforts to restore it by cutting down or using fire to remove invading trees could play an important role, too. One very essential piece of this puzzle, however, is whether the prairie will actually return to its natural order.

"One of the concepts we're working with is legacy effects, the lasting impact of a previous condition in an ecosystem, which in this case are the trees," Coffey says. "If we are seeing in the plant community that native plants are not returning, I predict that there are legacy effects in the soil and that maybe the nematode communities will give some indication of this."



Victory Coffey prepares to examine a nematode under a microscope.

WHAT'S APP? *EXAMINING THE IMPACT OF COMPUTER TECHNOLOGY ON TUTORS WHO TEACH KIDS WITH AUTISM*

By Joel Schlesinger

Technology is undoubtedly a powerful tool for educators.

But just how helpful can it be in providing early learning services for children with autism spectrum disorder?

That's the question researcher Amy Brown hopes to answer with her latest research project.

A master's student in the University of Manitoba's Department of Psychology, Brown says the issue is whether data on a student's progress can be best captured the old fashioned way – by pen and paper – or by using a new app developed for the iPad.

"The idea is that I'm evaluating two different methods of collecting data for children who are receiving early learning services provided through St. Amant," she says, referring to the Winnipeg-based centre that works with Manitobans who have developmental disabilities such as autism.

The children in question receive education via St. Amant through a program called Early Intensive Behavioural Intervention (EIBI). It is often provided in a one-on-one format with a tutor in the home of a child prior to reaching school age.

The tutor and child typically engage in a number of activities including matching real objects with the appropriate image in a photograph and working on making eye contact during social interaction.

The tutor then compiles the child's responses and other related information – like how long it took to answer a request – by writing them down on paper. The information is then stored in a binder for a supervisor who

assesses the progress.

Brown says the potential benefits of going digital are apparent. "We're a society that is leaning toward going green, so just establishing a process that uses less paper is really nice," she says. "We're also anticipating that it will save time in how long it takes us to actually record and use the information."

The administrative time savings could have many benefits for tutors and their students. Top of the list is that tutors can focus on learning rather than paper-work.

Moreover, "when you're working with kids, you're trying to have fun playing around with them, and papers can get damaged and lost," she says. "So having something stored in one place, safely, is a little bit more advantageous."

Dr. Toby Martin, Brown's research supervisor, says the research is cutting-edge in many ways.

For one, it leverages the power of information technology.

"An umbrella term that applies here is 'e-health' or electronically-based health-care systems," he says. "We have them already for many different areas of health care, but the problem with EIBI delivery is there has been very little application of it so far, despite its potential for a big benefit."

Brown says the hope is that digital data entry, compilation, storage and analysis will help improve learning and outcomes for students.

"It's great to have a program that can offer more efficient data collection because time is of the


essence for these kids," she says.

For example, with pen and paper, it takes much longer for a tutor and supervisor to review information and determine how the child's program should be adjusted to promote learning.

"Having a reduction in latency – where we can lessen the amount of time it takes to make those decisions – is always a welcome thing because that increases the time that can be spent on effective learning opportunities," Brown says.

"And that means there's a better chance we can target the areas that will help produce the best outcomes."

Ultimately, if information gathering and analysis can be made in near real-time to measure progress, supervisors and tutors can change the lesson plans more quickly or even direct consultants that are developing the programming to adjust curriculum to make it more effective. "Because we're publicly funded with limited resources, we want to make sure that we're maximizing our efforts with these children," Brown says. "We want to provide them with the best kind of learning that can help them be successful in their lives."



Amy Brown is using new technology to collect information about student progress.