## WHEAT: A constant battle to stay ahead of pathogens

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The OAC Constellation – named in honour of the Ontario Agricultural College (OAC) – was the first variety registered by the program in 2020. Two more varieties were registered in 2022.

More recently, OAC Virgo was registered, and OAC Vega is currently in the process of receiving registration.

"OAC Constellation, OAC Moon and OAC Virgo have been taken up or licensed to a seed grower group that represents seed growers across Canada," said Booker.

"OAC Constellation is now the yield and quality standard, or agronomic and quality standard for registration trials, winter wheat or similar market class."

The project has key breeding objectives: high yield, optimal maturity time, height, and structural strength.

Booker said that they screen for foliar diseases such as FHB, usually in fairly early generations. "We only need a few genes in our material and we can do that.

"We can select for genetic resistance," she said.

Booker works with many students looking to shape the future of wheat farming in Ontario.

"Some of the research that the graduate students do is centred on improving our selection efficiency, particularly fusarium head blight disease."

The use of AI has increased the efficiency of the research project. A Master's student in the program is developing a workflow where he can take images of a test that has been inoculated with the fungal pathogen that causes FHB, using those images to calculate the percentage of infection in the head.

"Normally, you would have to go through there and count the infected spikes in the head of the weak wheat, but he can do that using just an image of the wheat head and what he would like to do or what he is doing is scaling that up to the field level," Booker explained.

"It's a constant battle for improvement and staying ahead of the pathogen," said Booker of the development of new varieties.



## COX: Lack of reforms mean people are on their own

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Housing is not a commodity. Households have varying preferences, from ground-oriented housing (detached and townhomes) to high-rise condos. Indeed, a growing body of literature associates detached housing with higher total fertility rates. According to Statistics Canada, Canadians have favoured lower densities for decades, a trend that continued through the 2021 Census, a trend that continued through the 2021 Census, according to Statistics Canada.

With governments (virtually around the world) failing to maintain stable and affordable housing markets, it's not surprising people are taking matters into their own hands. Until fundamental reforms can be implemented in the most expensive markets, those seeking a better quality of life will have no choice but to leave.

Wendell Cox is a senior fellow at the Frontier Centre for Public Policy and the author of Demographia International Housing Affordability

## BEES: Growing body of research to protect pollinators

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we call external pesticides and internal pesticides, on the health and behaviour. What we call internal pesticides are miticides used by beekeepers to control raw mites in their colonies.

"Those are pesticides that the beekeeper introduces into the hive to control the mites in there and they are not innocuous to the bees, they are harmful to the bees, to some degree."

Guzman noted that the research centre has been informing beekeepers about which products not to use, and which can be used in order to cause the least damage to the bees.

"And then we can talk about the external pesticides, which are the ones that are used by growers in crop plantations or in their orchards. And of course, bees forage for the flowers that have been treated with pesticides," Guzman said.

The centre's research is finding specific formulations to control the varroa mite, netting positive results.

"We're finding additives for artificial diets for honey bees to improve their health and behaviour. Some of the additives that we're testing have not been tested in bees by anybody else in the world," said Guzman.

"What we're testing on the bees is giving us good preliminary results."

The centre's published work can be picked up by other researchers who want to conduct their own studies, which might have more applied aims to help the industry control the impact of stressors.

"The results with the most direct impact have improved the health of bees is the development of new formulations of miticides to control varroa mites," said Guzman.

The Honey Bee Research Centre works to improve life for honey bees and spread awareness to the community. It's home to a team of about 20 people, including technicians, students and volunteers.

The research centre also focuses on education, reaching more than 800 students a year via its a honey bee course. It also offers courses to the general public who want to learn more about honey bees or become a beekeeper.

Those are hands-on courses, said Guzman.

"We have some theoretical classes there, but at the same time, next to the classroom, we have the beehives and the experience opening hives, handling frames with bees, recognizing the different components of a hive, the different types of bees in the hive, how to control diseases, how to prepare the hives for the winter and how to manage the hives in the spring and summer."

The research centre is also currently undergoing renovations thanks to multi-million-dollar donations. The money will go towards creating a space that will attract more resources and connections with researchers and students.

Among the current research, Dr. Sabrina Rondeau, who earned her PhD. in environmental sciences at the University of Guelph, is studying the impact of agriculture on wild ground-nesting bees in field crops.

Rondeau, alongside Dr. Nigel Raine, has discovered an interesting finding: when hibernating, bumble bee queens are more likely to choose pesticide-contaminated soil rather than clean soil.

"My research focuses on understanding how bumblebee queens, which are crucial for the survival of bumble bee colonies, interact with pesticide-contaminated soils during a key phase of their lifecycle: hibernation," Rondeau explained.

"Bumble bee queens spend several months hibernating in the soil during winter, and the soil they choose for this hibernation period can be contaminated with a variety of pesticides commonly used in agriculture.

"In our recent study, we wanted to find out if bumble bee queens can detect and avoid soil contaminated with pesticides, or if they might be attracted to it," she said. "What we found is surprising. Instead of avoiding contaminated soils, the queens were actually more likely to choose pesticide-contaminated soils over clean soil."

That finding raises concerns that the exposure to pesticides could increase the risk of negative impacts on the health and reproduction of bees.

Rondeau's research project explores a largely unexamined aspect of pesticide exposure in bees, their interaction with soil contamination, particularly during the crucial hibernation phase of bumble bee queens.

"Our study shifts the focus to the soil environment, an often overlooked but vital habitat for bumble bee queens during winter."

Those findings could lead to new areas of research into bee behaviour, sensory perception, and better-informed agricultural practices aimed at minimizing risks to bees and improving pollinator health, she noted.