

Better Food

for a Better Planet

Research

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The University of Guelph plays an important role in agricultural education and research. **Our work in these areas is an intrinsic and value-added part of our long-standing partnership with the food sector and the Ontario Ministry of Agriculture, Food and Rural Affairs.** It also helps define the university as an institution that generates knowledge and trains new generations of researchers whose discoveries contribute to a healthier, more sustainable world.

Better food makes for a better planet. Food gives people strength and vitality, and healthy people who are properly nourished are better at fighting disease than those who are malnourished. Food is fundamental to life, and **Guelph is on the leading edge of innovative research dedicated to creating safe, plentiful, nourishing and sustainable food sources.**

We're tackling issues such as developing healthier, functional foods, reducing the risk of food-borne illnesses, finding inventive ways of adding cancer-fighting antioxidants to conventional food products, simplifying and improving fruit production, and discovering how to make beneficial foods taste better.

The following pages are a snapshot of the University of Guelph's ongoing, world-leading research initiatives and commitments to **creating the highest quality, safest and most nourishing food possible.**



RESEARCH HIGHLIGHT

Juicy and sweet peaches, cherries and plums bring a taste of summer to Ontarians, and they're jam-packed with cancer-fighting antioxidants. Plant Agriculture Prof. Jay Subramanian is breeding stone fruits that mature earlier and have increased antioxidant properties that will not only help meet local market demands and compete with U.S. imports, but also deliver powerful antioxidant benefits.

- Guelph Food Science researchers are developing on-site pathogen-detecting sensors to help **prevent food contamination outbreaks**. So far, they've produced a working model designed to instantaneously detect *Salmonella* contamination, with the hope of adapting their sensor to test for other contaminants in the near future.
- Bioactive isoflavones, the soybean components connected to improving human health, are making their way into healthy food products. Human Health and Nutritional Sciences researchers are one step closer to producing **soy-enriched bread** for the marketplace—bread that is not only healthier, but also features improved taste, texture and quality. The researchers believe their improved soy-enhanced bread could provide new opportunities for soybean breeders, growers and processors.
- Even when disguised with chocolate or vanilla flavouring, soy products sometimes have a “beany” taste, caused by a blend of enzymes and linolenic acid, that turns consumers off. In response, a Guelph research team is developing and breeding a **better tasting soybean variety** with genes specially selected for non-beany taste traits. The researchers believe their new variety will suit a number of commercial applications for the agri-food industry.
- Molecular and Cellular Biology researchers are looking at how to modify plant genes and enzymes to produce **healthier starches** that can be widely used in foods such as baked goods. These starches resist digestion and aren't absorbed as rapidly into the body. As a result, they may help to reduce the risk of Type 2 diabetes and colorectal cancers.

preventing food contamination
 cancer-fighting fruit grown
 treatments for bowel disease
 healthier milk ethno-cultures
 biofilm prevention medicinal
 asparagus for healthy gut

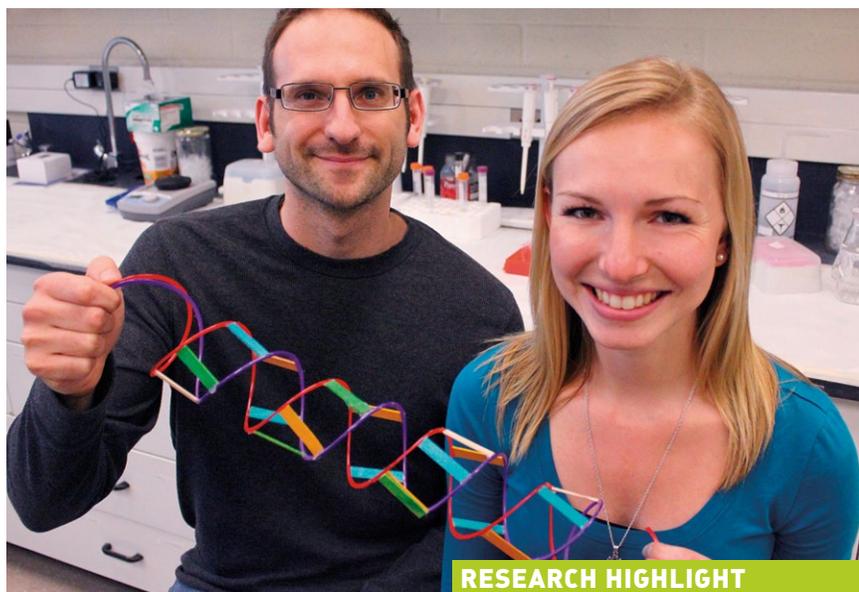
- You can't get too much of a good thing—especially when it comes to **cancer-fighting anthocyanins**, a type of antioxidant found in foods such as blueberries, cherries, strawberries and apples. Plant Agriculture researchers are working with living cells and human circulatory systems to see how they metabolize antioxidants, and how the amount of anthocyanins absorbed into the bloodstream can be increased. Food companies could then use this information to design functional food products that fight tumour formation.
- Manned missions to Mars may not be too far off, but the main difficulty is finding enough food to feed astronauts over the course of an entire mission to the Red Planet. An Environmental Sciences research team is leading an international research effort to determine which plants can be grown in carefully controlled environments to create the most nutritious, energy efficient and **renewable food source for astronauts** on a mission of several years.



RESEARCH HIGHLIGHT

Plant Agriculture researcher Mary Ruth McDonald has a homegrown solution to disease prevention. She's developing and testing new varieties of coloured potatoes and carrots high in antioxidants that can reduce the risk of cancer, heart disease and diabetes. What's more, these vegetables can be cheaply produced locally in large volumes and stored for long periods of time.

nation soy-enriched bread better tasting soy healthier starches
 growing food for astronauts omega-3 and protein fortification
 disease lower-fat cheeses reducing salt consumption
 natural vegetables spearmint leaves retailer advertising behaviour
 chemical compounds high-fibre dairy consumer-friendly red wheat
 products high-selenium products biodegradable “plastic” packaging



RESEARCH HIGHLIGHT

Genetic differences between ethnic groups may influence how people are able to metabolize essential fatty acids, says Nutrigenomics Prof. David Mutch, pictured here with research student Kaitlin Roke. Understanding how different ethnic groups process fats could eventually lead to a demand for farmers to grow and produce natural foods that are tailored to better suit specific ethnic groups, based on their underlying genetic makeup.

- Soy peptides have already been found to lower cholesterol and improve the body’s immune response. And they can also act as antioxidants, reducing the risk for cancer and heart disease. Guelph Food Science researchers are now investigating the potential for soy-derived peptides to be used in **treatments for inflammatory bowel disease**.
- Many older adults living in long-term care facilities aren’t getting enough taste or nutritional content out of their daily menus. That’s why Food Science and Human Nutrition researchers are joining forces with the Department of Family Relations and Applied Nutrition to develop foods and purees fortified with **omega-3 and protein** to ensure that these older adults are getting their nutritional fill with every meal.

- Food Science researchers are putting their soft matter physics knowledge to good use by studying how milk’s structure changes during the cheese-making process. By understanding how milk molecules interact, they can manipulate the process to create **lower-fat cheeses** with a wide variety of tastes and textures, boosting product offerings to consumers.

- Guelph Food Science researchers are part of a multidisciplinary, multi-institutional team that’s developing **new approaches to reducing salt consumption**, including using emulsions for a more gradual, controlled salt release. But for these emulsions to keep people from reaching for the salt shaker, the researchers first need to determine the roles different salt types and concentrations play as a structural component within food, how they interact and are broken down by people’s saliva, as well as how they react with taste buds.
- Food Science researchers are developing an ultraviolet reactor to **remove harmful bacteria from raw milk**. Unlike traditional thermal pasteurization, the UV reactor leaves milk’s nutritional content intact and doesn’t affect texture or taste. Though raw milk remains illegal to sell or distribute, these researchers hope their technology will help to put UV-treated raw milk on store shelves alongside pasteurized milk within the next 10 years.
- New Ontarians longing for their native country’s fruits and vegetables are frustrated by high-priced imports, or by problems that arise in trying to grow the foods themselves. Guelph researchers have launched a program called **Ethno-Cultural Vegetables Ontario** that will create awareness about the benefits of locally produced ethno-cultural vegetables, and help farmers learn how to grow them.

- Tea, the world's most widely consumed prepared beverage, may help people cope with osteoarthritis, a disease affecting one in 10 Canadians. Guelph Plant Agriculture researchers have bred **spearmint leaves** to contain high amounts of rosmarinic acid, an anti-inflammatory component beneficial to osteoarthritis sufferers.
- Convenience could be the root evil in consumers' unhealthy food choices, according to a Food, Agriculture and Resource Economics professor, who is studying **retailer advertising behavior** in major grocery chains. He's zeroing in on how foods, such as ready-to-eat meals or microwavable dinners, are marketed for their convenience and ease of use, over fresh fruits and vegetables.
- For centuries, medicinal plants have provided a natural way for people to treat and prevent sickness and disease and fight signs of aging. Guelph Plant Agriculture researchers are combining ancient Indian ayurvedic medicinal knowledge with modern-day cloning and tissue growth techniques to mass produce plants with the highest possible amounts of **medicinal compounds** in a safe, greenhouse environment.
- Getting your daily fibre fill could be made that much easier thanks to Food Science researchers who are working to enrich three dairy products—milk shakes, pudding and ice cream—to help meet Canadians' **fibre needs**. These products could also help lower blood glucose levels, making them an ideal alternative for diabetic individuals.

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RESEARCH HIGHLIGHT

Starting early in life with a steady diet of omega-3 fatty acids could be key to reducing breast cancer, says Human Health and Nutritional Sciences researcher Prof. David Ma, along with graduate students Mira MacLennan (middle) and Breanne Anderson (left). Their early findings show that exposing embryos, babies and toddlers to certain nutrients can influence chronic disease later in life.

- Bacterial biofilms can form on nearly any surface, easily contaminating food and causing deadly bacterial outbreaks. A Guelph Physics researcher is leading a multidisciplinary team from the Advanced Foods and Materials Network to develop and test a number of **biofilm prevention and removal strategies**, such as bacteria-killing peptides, which could then be used by the food industry.
- Cows can be fed selenium, a mineral high in anti-cancer properties, to combat diseases such as mastitis. Now, Animal and Poultry Science researchers are incorporating selenium into milk protein to create **high-selenium products** for humans. This research team is studying whether high-selenium products consumed as part of a regular diet can reduce the risk of breast tumours and insulin resistance.
- People consuming whole-grain foods made from red wheat have traditionally sacrificed some flavour for the sake of health benefits. The culprit is the astringent and bitter notes in red wheat. Food Science researchers want to know more about red wheat's chemical properties. They hope that by determining red wheat's composition, they can relate certain characteristics to taste and inform farmers which **red wheat variety is the most consumer-friendly**.
- Fresh asparagus contains a compound that is believed to help with symptoms of inflammatory bowel disease. But researchers say eating the food whole, rather than merely isolating the active compound, may prove more beneficial. They're collaborating on a study that looks at the **effects of foods such as asparagus on gut health**.
- Instead of conventional petroleum-based food packaging, Guelph researchers are working on completely **biodegradable "plastic" packaging** made from beans that will instantly dissolve in boiling water and leave no trace of the container. This plastic is also UV protective, which helps to enhance food product shelf life.

BRUCE SARGENT

KYLE RODRIGUEZ

