

Ideas on the Edge



KARI KRAMP

Supercritical Squeeze

CARBON DIOXIDE CAN SQUEEZE VALUABLE EXTRACTS OUT OF PLANT MATERIALS. KARI KRAMP AT LOYALIST COLLEGE IS PUSHING THE TECHNOLOGY IN NEW DIRECTIONS.

“This was a storage room,” Kari Kramp says with a sweep of her arm. “Now it’s a state-of-the-art lab.” The room in question contains a bewildering collection of stainless steel tanks, connecting pipes, and valves. The initiated, however, will recognize a supercritical CO₂ extractor.

Extraction is a process used in the manufacture of a wide range of products from medicines to fragrances. It generally

involves dissolving a raw material in a liquid in order to separate and harvest a particular substance or essence. A coffee maker is a simple extraction device that uses hot water as a solvent to release flavour compounds.

More complex extraction processes, however, often use carbon-based organic solvents like ethanol and hexane. They’re effective, but they can leave harmful residues in the extracted materials, and their handling can pose environmental risks.

Enter the supercritical CO₂ extractor. “Carbon dioxide is non-toxic,” Professor Kramp explains, “and it doesn’t leave a residue, so you get a pure, clean extract.” The device works by pushing pressurized CO₂ through raw plant material. Pressurization puts the gas into a “supercritical state”—

RESEARCH THAT MATTERS REAL-WORLD BENEFITS FOR ONTARIANS:

- purer natural extracts for pharmaceutical and natural food products
- less pollution from industrial-scale extraction

a condition in which it takes on some of the properties of a liquid, enabling it to function as a solvent.

The technology is versatile as well as environmentally friendly. “With traditional methods,” says Professor Kramp, “you would need to use several different solvents to take out different compounds from plants. But with CO₂, you can change the solvent properties just by changing the temperature and pressure. This way you can selectively target and remove groups of compounds. It’s



Another research project involves the extraction of a heart-healthy fatty acid supplement from Labrador shrimp.

The Ontario Innovation Trust helped fund the purchase of two extractors for the new Loyalist lab—a small unit and a mid-sized one. The two extractors enable Kramp and her colleagues to conduct experiments on small samples, then scale up to larger quantities as part of investigating the commercial viability of

much more efficient.”

Supercritical extraction has been used for some time to make de-caffeinated coffee, but Loyalist researchers are working with several private partners to take the technology in new directions.

Bioniche, a Belleville manufacturer of plant-based pharmaceuticals, is using

**Loyalist College,
Belleville**

the facility to explore the extraction of a promising anti-viral compound from a plant that grows locally.

producing a particular extract.

“The CO₂ process is going to make a real improvement in the quality of products that are on the shelf,” says Professor Kramp. But she also believes the research at Loyalist will produce another more far-reaching benefit. “We’re exposing students to working in the field of applied research. We’re building young scientists and innovators for the future.”

Project: Produce and Evaluate Botanical Extracts Made with CO₂ Technology

Institution: Loyalist College

Research Sector: Life Sciences

Principal Investigator: Kari Kramp

Trust Investment: \$183,720

Total research investment from all sources: \$459,300



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Infrastructure for Innovation About the Ontario Innovation Trust

The Ontario Innovation Trust was created in 1999 by the Government of Ontario to invest in research equipment and facilities at Ontario’s universities, colleges, hospitals and other non-profit research institutions. The Trust is governed by a volunteer Board of Directors, according to the terms of a Trust agreement established by the Ontario government. A small permanent staff looks after day-to-day operations.

Since its inception, the Trust has committed almost \$843 million to strengthen Ontario’s position in the global marketplace of ideas. This represents more than a third of the \$2.44 billion in total funding that has been invested in Trust-supported projects.