

CCES 2025 Session Summary

Nature's Blueprint: Advancing Opportunities in the Circular Bioeconomy and through Regenerative Product Innovation

Nature's principles and basic building blocks are delivering opportunities to rethink our products and materials within a circular bioeconomy. Be inspired by product innovation from nature-based feedstocks - from forests, plants, fungi, algae, bacteria, and more - which collectively unlock opportunities for regenerative product design, material innovation, and exciting new applications.

Date / Location: Tuesday, April 15, 2025 / Montreal, Canada

Speakers:

- **Shelley King**, CEO, Natural Products Canada (moderator and speaker)
- **Nivatha Balendra**, Founder & CEO, Dispersa
- **Geoffroy Renaud**, CEO, Mycélium Remédium Mycotechnologies
- **Fannie Laroche**, CEO & Co-Founder, Flaura Cuir Végétal

SUMMARY

Speaker Presentations

This conference session, moderated by Shelley King, CEO of Natural Products Canada (NPC), explored the expanding bio-based solutions industry, highlighting its importance to the circular economy, as well as its opportunities and challenges. The session featured three NPC-supported companies: Dispersa, Mycélium Remédium Mycotechnologies, and Flaura Cuir Végétal.

Natural Products Canada: Fostering Innovation

Shelley provided an overview of Natural Products Canada's mission, emphasizing the global shift towards sustainable products driven by climate change, supply chain disruptions, and population growth.

NPC defines natural products as bio-based solutions that benefit people, animals, and the planet, utilizing naturally occurring molecules across diverse sectors such as biochemicals, clean tech, agriculture, household and personal care, packaging, apparel, biomaterials, food, and nutrition. It is projected that by 2050, roughly half of all products will be bio-based, representing a \$4 trillion opportunity.

Shelley also detailed the unique hurdles faced by bio-based companies, including technical complexities, scaling difficulties, and significant capital requirements. NPC's "strategic angel" approach provides advice, connections, and capital to early-stage companies. Since 2016, NPC has invested over \$9.1 million in 82 companies, resulting in 260 new products, increased employment, and over \$282 million in revenue. She then showcased several successful companies within NPC's ecosystem, including Phycus (upcycling woody biomass for glycolic acid), Freshr (natural antimicrobial coating for protein packaging), Bioform (seaweed and woody biomass bioplastics), and Aruna (compostable feminine products from hemp and other plant fibers).

Dispersa: Revolutionizing Surfactants with Food Waste

Nev, CEO and founder of Dispersa, presented her company's work on scaling waste-derived biosurfactants. Inspired by the Lac Mégantic train crash and her personal experience as a cancer survivor, Nev set out to create non-toxic, safe, and transparent materials.

She explained that surfactants, vital in many industries and valued at \$60 billion, are typically derived from palm or petroleum, both of which carry substantial environmental and health consequences. While natural biosurfactants exist, they often depend on edible oils and sugars, impacting the food chain. Dispersa's innovation lies in using food waste, specifically used cooking oils and industrial food side streams, to produce biosurfactants through fermentation.

Their inaugural product, PureSurf, targets the household, industrial, and institutional cleaning product markets, enhancing the performance of hand soaps, cleaners, and detergents. Nev proudly announced Dispersa's recent closing of a \$5.8 million seed round, led by Nadira Ventures (an NPC associate fund), which will be used for commercialization, fulfilling purchase orders, expanding sales, and team growth.

Mycélium Remédium Mycotechnologies: Harnessing Fungi for Waste Solutions

Geoffroy from Mycélium Remédium Mycotechnologies, a PhD student specializing in applied mycology, introduced his company's focus on mycoremediation—utilizing mushrooms to tackle waste. He asserted that "every waste is an abandoned resource" and critiqued the lack of commercial endeavours for waste upcycling, contrasting it with advanced methods for resource extraction and commodification.

Geoffroy highlighted the alarming volume of residue generated annually and the environmental issues linked to persistent waste like plastics. His research centers on mycelium-based materials, where mycelium acts as a binder to bond and degrade various residues. He provided examples of mushrooms transforming oil spills and wood residue into viable soil, a process often overlooked due to a perceived lack of profitability in pollution remediation alone.

Mycélium Remédium Mycotechnologies aims to "hack consumer society" by integrating mushroom-derived materials into everyday objects, thereby funding the remediation process. Their three pillars include substituting eco-toxic products (like styrofoam), achieving scalable production to make these alternatives affordable, and ultimately using the process to remediate existing plastic waste. They envision replacing plastic with mushroom-based materials, demonstrating both ecological impact and commercial viability, and are currently seeking funding for a pilot-scale factory.

Flaura Cuir Végétal: Transforming Apple Waste into Luxury Leather

Fanny, co-founder of Flaura Cuir Végétal, presented their innovative approach to transforming apple biomass into high-end, bio-based leather. She noted that Quebec's apple orchards generate 70,000 tons of apple biomass annually, contributing 20,000 tonnes of CO2 emissions, while the fast fashion industry produces 92 million tonnes of waste yearly.

Flaura views this apple waste as an opportunity to create a luxurious and sustainable leather alternative. Fanny, a vegan with a background in fashion and styling, partnered with Gregory, a chemist, to develop a durable, bio-sourced, plant-based leather. She pointed out that most current vegan leathers are plastic-based (polyurethane or PVC), derived from petroleum, and significantly contribute to pollution. Flaura's apple leather aims to be eco-friendly (89% fewer GHG emissions than traditional leather), fully circular, and completely free of water, plastic, or harmful chemicals.

With the vegan leather market projected to reach \$150 billion by 2030 and the bio-based leather market experiencing rapid growth, Flaura is well-positioned to meet the demand for high-end, sustainable alternatives. Their immediate focus is on the high-end furniture industry in Canada and the luxury fashion markets in France and Italy. They are actively seeking early buyers for their innovative material, distribution contacts, and financial investments to scale their operations and optimize production processes while maintaining their commitment to a circular economy in Quebec.

Fauna's presentation concluded with a series of statistics and data points highlighting critical environmental issues and the potential of bio-based alternatives, including:

- **Water Footprint of Leather:** Producing one kilogram of leather requires approximately 17,000 liters of water, primarily due to livestock farming and the tanning process.
- **Toxic Tanning:** Over 80% of the world's leather is tanned using toxic chromium, a pollutant famously linked to environmental and health concerns.
- **Apple Waste in Quebec:** Quebec annually grows 90,000 tonnes of apples, with about 70,000 tonnes generating waste like skins, pulp, and cores.
- **Global Fashion Waste:** A staggering 73% of global fashion waste is either landfilled or incinerated, with only 1% recycled into new garments.
- **Versatility of Vegan Leather:** Vegan leather products encompass a wide range of materials derived from various sources.
- **Environmental Benefits of Vegan Leather:** Vegan leather production offers numerous environmental advantages.

Panel Discussion: Challenges and Opportunities in Bio-Based Supply Chains

A significant portion of the session was dedicated to a lively Q&A with the presenting entrepreneurs, focusing on the practicalities and challenges of their waste derived and bio-based supply chains.

Securing Waste Supply

An attendee raised a crucial question regarding securing waste supply as demand for bio-based products increases.

- **Flaura Cuir Végétal:** Flaura currently purchases apple pomace and has secured enough supply from one partner for the next 5-7 years. As they grow, they anticipate needing to secure new supply relationships.
- **Mycélium Remédium Mycotechnologies:** Geoffroy explained that for Mycélium Remédium Mycotechnologies, waste supply is not an issue, as they focus on large-scale waste management and are more concerned with commercializing their solutions than running out of waste.
- **Dispersa:** Dispersa utilizes used cooking oils and untapped side streams of sugars. They pay for used cooking oils, which are part of an existing market (e.g., biofuels), but the sugars are typically untapped. They localize their sources in Canada and maintain tight control over the specifications of the waste to ensure product quality. They work with oil rendering companies and food producers.

Overcoming Economic and Market Challenges

The discussion shifted to the biggest pain points in transforming waste into valuable, economically viable, and sustainable resources.

- **Flaura Cuir Végétal:** Fanny identified marketing and consumer education as significant hurdles. Consumers often don't understand why they should pay more for products based on a circular economy model, necessitating a strong educational push.
- **Mycélium Remédium Mycotechnologies:** Geoffroy highlighted the challenge of "planned economy" where ecosystemic services of waste transformation are not highly valued. He noted that while their products are more expensive upfront due to decades of cheap goods fueled by resource extractive practices, developing local bio-regional economies offers long-term advantages in terms of cost and resilience to shocks. He emphasized the importance of making bio-based products "desirable" to drive demand.
- **Dispersa:** Nev outlined a threefold challenge:
 1. **Performance:** Overcoming the traditional perception that natural or biomass-derived materials underperform. Dispersa focuses on data-driven approaches to prove that their waste-derived biosurfactants compare favorably, or even outperform, conventional surfactants.
 2. **Traceability:** Navigating differing regulatory requirements for reporting across regions (e.g., EU, US, Canada) regarding the sourcing of waste, especially for new side streams where data may be limited.
 3. **Quality Control:** As an ingredient manufacturer, ensuring consistent product viability despite variations in waste streams requires stringent quality control.

Shelley concurred that consumers and businesses expect bio-based products to perform identically to traditional ones, often at the same or lower price, which are significant challenges. However, she observed a societal shift where natural and alternative products are gaining traction, suggesting a future where exact performance and cost parity might not be the sole deciding factors.

Accessing Government Funding

The topic of government funding for early-stage bio-based companies was also addressed.

- **Dispersa:** Dispersa has extensively utilized non-dilutive government funding from both federal and provincial programs in Canada, particularly in their first three years. They aimed to maximize this "free money" before seeking venture capital.
- **Mycélium Remédium Mycotechnologies:** The company has received some government support through university research projects and demonstrations, and they invest income from natural health products back into their mycelium-based material development. Geoffroy also highlighted a current funding opportunity closing soon.
- **Flaura Cuir Végétal:** As a pre-revenue company, Flaura also relies heavily on government funding, especially for R&D and proof-of-concept stages. They find it more challenging to secure funding closer to commercialization.

Shelley reiterated NPC's role in providing various forms of funding (equity, debt, non-dilutive) and advised young entrepreneurs to maximize non-dilutive funding early on. However, she cautioned against over-reliance on non-dilutive funding as it can make a company less attractive to investors if it persists for too long without securing private capital.

Waste Streams and Circularity in Production

A critical question was posed regarding the additional waste streams, energy, and water footprints generated during the transformation of biomass into final products, particularly compared to more straightforward fossil fuel-derived processes.

- **Dispersa:** Nev explained that Dispersa chose feedstocks that require minimal pre-treatment, directly introducing them into their reactors. They conduct regular life cycle analyses (LCAs) at every scale-up stage to understand and improve their environmental impact. Their process is significantly more sustainable than conventional surfactant manufacturing, producing at least three times less CO2 equivalent emissions at scale, largely due to using food waste and avoiding palm/petroleum. While their fermentation process generates biomass (cells), they are moving towards a continuous system to maximize recycling and reuse water as much as possible.
- **Flaura Cuir Végétal:** Flaura is currently evaluating their full life cycle. They emphasize using zero-water ingredients and aim for a "short circuit" in their supply chain, keeping all operations and sourcing within Quebec to minimize transportation and maximize traceability. Fanny noted that the specific technical details of their solvents would be better addressed by their chemist.

Shelley acknowledged the validity of the concern, emphasizing that NPC evaluates companies based on their intent to improve their environmental footprint, even if perfection isn't immediately achievable. The goal is to ensure the new process isn't worse than existing alternatives.

End-of-Life Planning for Bio-Based Products

An attendee inquired about the end-of-life plan for products made from bio-based materials, such as furniture or handbags.

- **Flaura Cuir Végétal:** As a B2B business, Flaura sells its leather to designers, who then are responsible for the end product. However, Flaura designed their material to be biodegradable in the correct environment within 250 days with the right enzymes. Fanny acknowledged that achieving this requires specific municipal composting facilities, similar to compostable plastic cutlery. She expressed hope that future regulations for next-generation materials will streamline the end-of-life process.
- **Mycélium Remédium Mycotechnologies:** Geoffroy added that while compostable products are technically viable after 30 days, they are not always recognized by government regulations. He suggested that if customers don't know what to do with the mycelium-based products at their end-of-life, they can be brought back to Mycélium Remédium Mycotechnologies or their partners for further looping (e.g., recycling the mycelium-based product into a new while extracting valuable bioactive compounds in the recycling process).

Scaling Innovation: Looking to the Future

The discussion concluded with a broader question about how entrepreneurs in this innovative space think through the challenges of scaling to a global level.

- **Dispersa:** For Nev, the core motivation is to create impact by seeing Dispersa's ingredients used in as many industries as possible. They use a "Theory of Change" exercise to highlight non-KPI impact metrics. Their strategy involves strategic roadmap planning and working backward from long-term goals. Crucially, they maintain close-knit conversations with customers from early development stages to ensure their material meets customer needs at every scale, facilitating commercial implementation across various verticals (cleaning, personal care, cosmetics, etc.).

- **Mycélium Remédium Mycotechnologies:** Geoffroy noted that the conversation about running out of waste is a positive one, signifying the success of addressing an issue and creating fruitful solutions. He envisions a decentralized model, similar to community health services, with specialized "points of service" to handle specific types of residue stockpiles. He believes that by demonstrating how useful materials can be made from waste, they can "lock in partners" and drive greater adoption. He concluded by suggesting that the conceptual revolution is mature, and the remaining issues are often in our minds, with ample resources available if directed effectively.
- **Flaura Cuir Végétal:** Fanny's design intention stems from her personal passion for fashion and her desire to create a high-end, ethical alternative to traditional leather that designers would be proud to incorporate into their collections.
- **Dispersa:** Nev's motivation is rooted in her experiences witnessing the environmental impact of oil spill cleanups and the lack of transparent, non-irritant ingredients in everyday products during her cancer treatment. She believes in changing the way chemicals are produced to be better for the environment and human health, advocating for greater transparency in ingredients and a shift in discourse away from "chemicals are bad" to "chemicals need to be produced differently." She emphasized the growing regulatory focus on chemical ingredients like sulfates, phthalates, and particularly 1,4-dioxane—a common byproduct of surfactants now strictly regulated by the US EPA and California's Proposition 65. This trend fuels her vision for a future with safe ingredients in all everyday products, including cosmetics, cleaners, and even ice cream.

The session underscored the immense potential of bio-based solutions to address pressing environmental challenges, driven by passionate entrepreneurs, supportive organizations like Natural Products Canada, and a growing societal demand for sustainable alternatives. Shelley concluded the session by highlighting a shared characteristic among successful entrepreneurs: a defiant determination to prove skeptics wrong, encapsulated by the phrase: "watch me!"