PRESENTATION

Session: **Innovative Cotton Products**

Title: **Infinite Circularity**

Speaker: **Alberto Candiani,** Candiani Denim, Milan, Italy

Presentations are available in the conference archive: https://baumwollboerse.de/en/competencies/international-cotton-conference/speeches/

Conference Organization

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Candiani
DENIM
PRESENTS
COREVA™
PLANT-BASED COMPOSTABLE STRETCH TECHNOLOGY

COREVA™

A vision for the future

"COREVA™ is just the start of what we hope to achieve through our research and development at Candiani. Our long-term vision is a circular model built on the connection between industrial production and regenerative agriculture. We are fighting landfill and waste in a different way, in our way. Our target is to close the loop, meaning that our fabrics (all the ingredients they are made of, and all the waste made during production) can be returned to nature."

It all started in 2015, when Alberto Candiani, at his local delicatessen, saw something new. This time the salami hanging behind the counter, that he had seen thousands of times before, became more intriguing. What was that string suspending the salami in place? It seemed to perfectly stretch and bounce. While taking a closer look, Alberto found out the casing was made from natural rubber, and that's when the wheels started turning.

Five years later, and thousands of hours of R&D later, Candiani Denim is able to present the original alternative to petroleum-based elastomers to the denim industry. It is a patented stretch technology that is 100% plant-based, derived from 100% renewable resources, that when core-spun into organic cotton fibers creates the world's first compostable stretch denim.

COREVA™ Stretch Technology has allowed Candiani to achieve a truly circular, regenerative model in which raw materials become fabric, then garment, and then return to nature thanks to their biodegradability.

RC 7234
sioux shaper c

SZ 7207
sioux pad

COREVA™

WHY

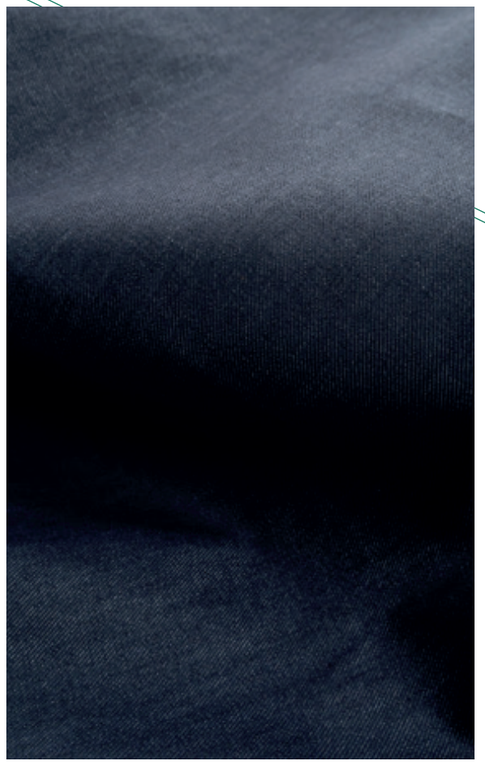
Did you know that approximately **25 billion unworn garments** end up in landfills every year? The fashion industry has a serious waste problem, and because of Petrol-Based synthetic yarns, discarded jeans take **hundreds of years to decompose, leaving a negative impact on the planet.**

With this problem in mind, Candiani set out to find a solution, COREVA™, the world's first compostable stretch denim.

WHAT IS IT

COREVA™ is an innovative technology developed and patented by Candiani Denim that uses a **GOTS approved plant-based yarn obtained from 100% natural rubber**. When combined with organic cotton this results in a **yarn that is completely natural and plastic-free.**

COREVA™ replaces conventional synthetic and petrol-based elastane often used in stretch denim with Candiani's new, custom-engineered, bio-based component. With this technology Candiani has achieved an innovative compostable stretch denim fabric - without compromising the elasticity, physical qualities, and durability of jeans.



100% BIO-BASED
100% BIODEGRADABLE & COMPOSTABLE

WHAT ARE THE BENIFITS

As this technology is made with natural rubber, it is the **first renewable, plant-based alternative** to synthetic, non-renewable petrol-based elastane. COREVA™ has been tested to prove its compostability, in mature compost in **less than six months**, without releasing the toxic chemicals and microplastics of conventional elastane, in compliance with the **EU Standard EN13432** – offering an **eco-compatible, end-of-life solution** for stretch denim.

CIRCULARITY
of the raw materials

Thanks to COREVA™, Candiani has created a truly circular and regenerative model in which natural materials are turned into fabric, then garment, and, instead of being thrown away, **COREVA™ returns to the earth naturally, leaving a positive impact on the environment.**

Conventional Stretch

COREVA™ Stretch

Positive Impact

COMPOSTABILITY TEST

COREVA™ has undergone tests to assess biodegradability, disintegration, and eco-toxicity. These tests, when put together, determine compostability. The tests were conducted at **Innovhub*** following the requirements of the **EU Standard EN 13432**.

As there is not yet a dedicated compostability test for fabric such as COREVA™, Innovhub selected the closest material category possible, packaging, to test COREVA™'s biodegradability and compostability status. The following are the EU Standard EN 13432 requirements to pass the compostability test:

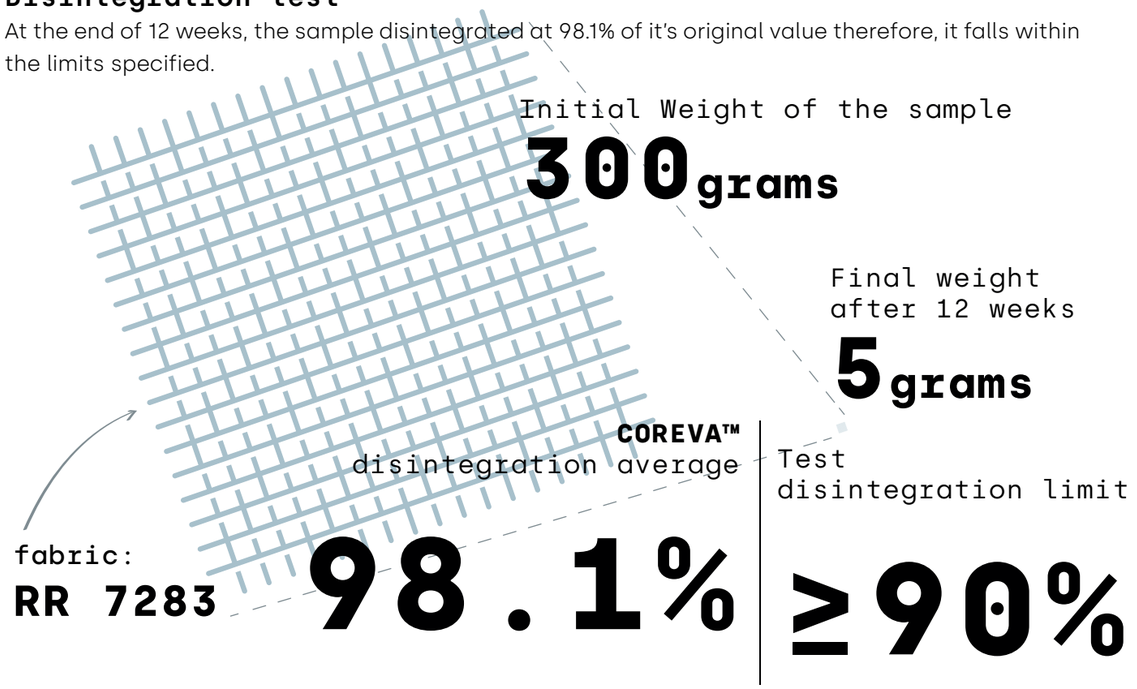
- **After 12 weeks, no more than 10% of material pieces can be larger than 2mm.**
- **Within 6 months, the test sample must produce at least 90% of the CO_2 that is generated by the control fabric (in this case, the control material used was a cellulose microcrystalline, Avicel).**
- **There must be no evidence of negative environmental effects on the composting process.**
- **There must be low levels of heavy metals (such as copper, nickel, lead, chromium etc.).**
- **There must be no effect on bulk density, pH, salinity, volatile solids, total nitrogen, total phosphorus, total magnesium, total potassium, and ammonium nitrogen characteristics of the compost.**

The requirements for the EN 13432 standard were established using the test method, ISO 14855:2012. This method examines aerobic biodegradability of plastics made of organic compounds, in controlled composting conditions with a constant 58±2 °C and 50% ±5% humidity.

***Innovhub - Experiment Station for Industry** is an accredited laboratory certified by ACCREDIA (National Accreditation Body), which guarantees the impartiality of all parties within the laboratory, the technical competence and professionalism of the staff, the adequate use of equipment, and the compliance of the organization with the management and technical requirements prescribed by the UNI CEI EN ISO / IEC 17025 standard.

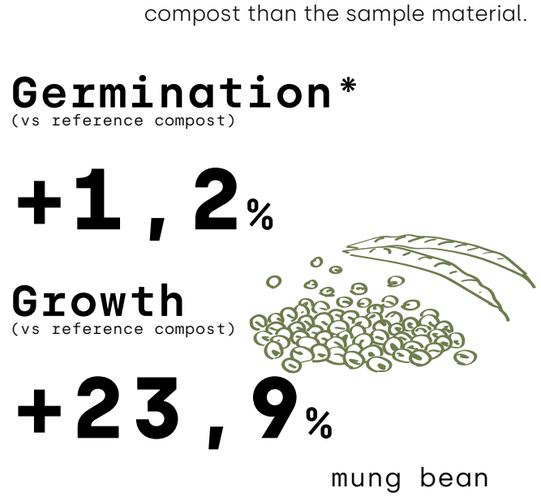
Disintegration test

At the end of 12 weeks, the sample disintegrated at 98.1% of it's original value therefore, it falls within the limits specified.



Evaluation of the compost created by COREVA™

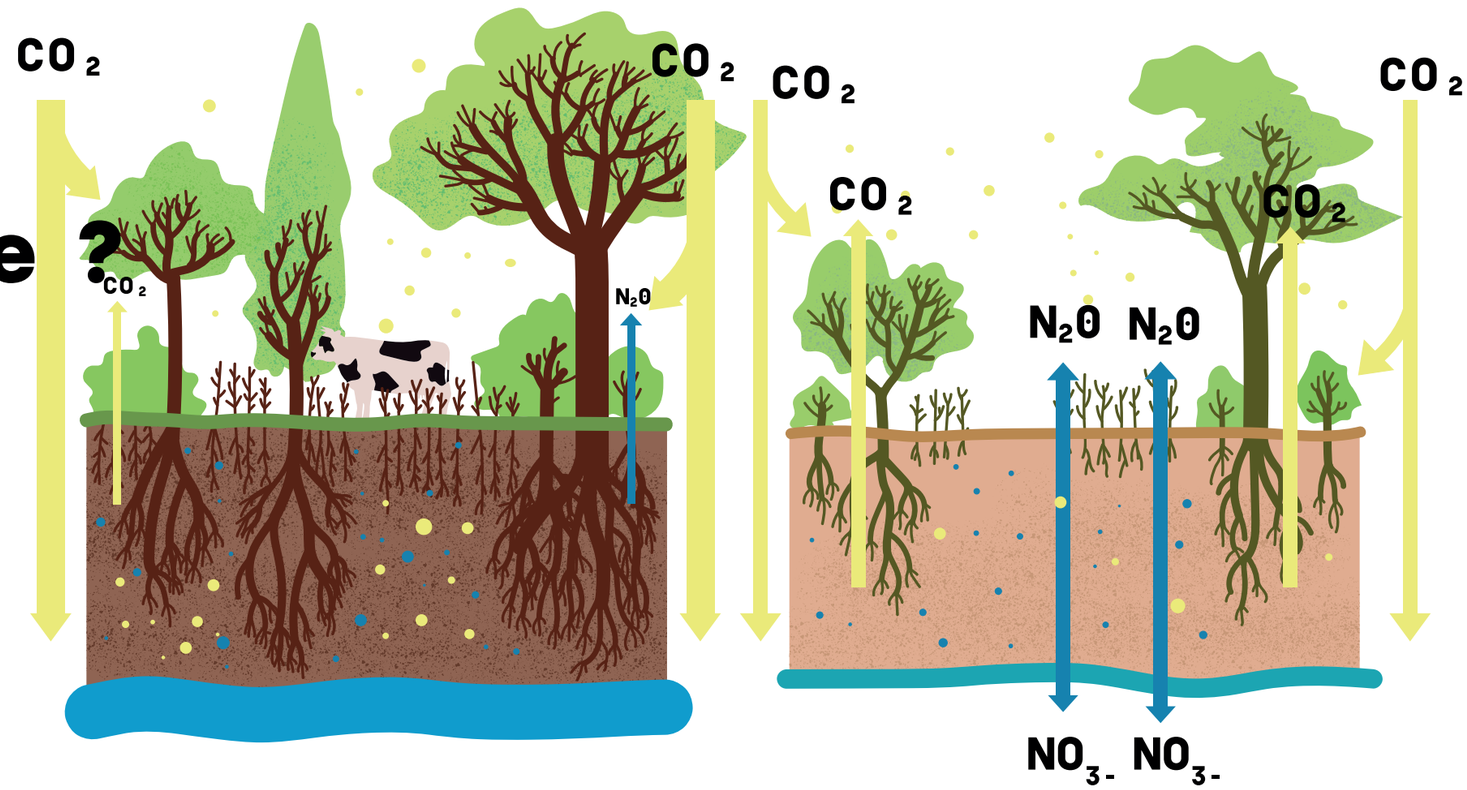
Once confirming the compostability of COREVA™, it was necessary to test the soil where the fabric composted to determine its ecotoxicity. The pythotoxic effect test* was conducted with two different types of seeds: mung bean (*Vigna radiata*) and barley (*Hordeum vulgare*). The sowing was conducted in pots filled with a mixture containing the compost created by COREVA™ and compost created by control material. The results determined there was significantly more growth from the COREVA™ compost than the sample material.



***Pythotoxic effect:** test for assessing the effects of chemicals on plants.
***Germination**: the growth of a seed into a young plant or a seedling.

Rethinking the approach

Why regegerative agriculture?



The problem with conventional agricolture

The conventional way of growing food and fiber is bad for people and the environment. It is a broken model, which has sought to industrialize agriculture and make it more efficient by cultivating single crops on a given field and by moving animals from the farm to intensive feed lots. The result is the creation of large amounts of waste and reliance on synthetic chemicals. It is also a very inefficient use of land, which leads to biodiversity loss, deforestation, and soil depletion. Industrial agriculture is also known to be one of the largest emitters of GHGs, a significant contributor to climate change, and responsible for air and water pollution. Likewise, its dependence on synthetic pesticides and fertilizers, sometimes highly toxic, negatively impact the environment and is thought to be dangerous to human health.

The Journey

Organic has been considered the gold standard for eco-friendly agricultural practices for decades. So much so that in many countries, organic standards have been written into law in one capacity or another. Building off organic practices, regenerative agriculture is considered the new frontier and a fundamental transition for the fashion industry. The funny thing is that regenerative practices are far from something new. They are built upon indigenous wisdom, which has always prioritized harmony between the environment and its human stewards.

Regenerative Agriculture Makes Healthy Soil

- More biodiversity above and below ground
- More bioproductivity
- Improves nutrient efficiency
- Improves soil fertility and structure
- Increases soil organic matter
- Lowers evaporation, runoff, and erosion
- Improves hydrologic cycle
- Recovers groundwater levels
- Higher crop resistance and natural weed management
- More carbon sequestration
- Less emissions released in the atmosphere

Conventional Agriculture Depletes Soil

- Less biodiversity above and below ground
- Less bioproductivity
- Decreases nutrient efficiency
- Destroys soil fertility and structure
- Decreases soil organic matter
- Increases evaporation, runoff, and erosion
- Disrupts the hydrologic cycle
- Depletes groundwater levels
- Makes crops more vulnerable to weeds and pests
- Less carbon sequestration
- More emissions released in the atmosphere

Restoring Ecological Balance

About the regenagri® Content Standard

The regenagri® Content Standard is an initiative and certificate which aims to support farms and organizations across the supply chain to transition to regenerative farming practices. The regenagri® standard criteria have been developed to measure and monitor the implementation of regenerative practices and their ecological outcomes. It is designed for continuous improvement and offers members a complete solution for measuring and reporting the regenerative process.
It aims to:

- **Increase soil organic matter**
- **Encourage biodiversity**
- **Restore the natural function of the ecosystem**
- **Store more CO_2 underground**
- **Improve the hydrogen, carbon, and nutrient cycles**

Why has Candiani chosen the regenagri® Content Standard?

The regenagri® Content Standard focuses on continuous improvement rather than maintaining a status quo. Candiani believes this gets to the heart of regenerative agriculture and makes the standard very farmer friendly.

Since on-farm data is individually evaluated, regenagri® takes into consideration variations between different ecological environments worldwide, making this standard applicable anywhere. Beyond granting the certification, regenagri® supports farms and organizations with a complete solution to facilitate the continued adoption of regenerative farming methods.

Scheffer is Candiani's regenerative agriculture partner, based in Brazil. They started adopting regenerative agricultural practices in 2015 and aim to be 100% regenerative in all their farms by 2030. Scheffer runs a highly efficient, state-of-the-art operation that includes a bio-factory producing specific microorganisms that act as bio-based controls for pests and diseases while creating healthy soils and reducing the need for chemical inputs. Additionally, all the wastes from the bio-factory production process are used as sustainable fertilizers and soil additives.

THE REFRAME COLLECTION

REGENERATIVE COTTON

INDUSTRIAL AGRICULTURE IS A BROKEN MODEL

The conventional way of growing food and fiber is detrimental to the planet and dangerous to human health. It is a broken model that has sought to make agriculture more productive by cultivating single crops on a given field (monocultures) and moving animals from the farm to intensive feedlots. The result is a heavy reliance on pesticides and fertilizers, sometimes highly toxic, inefficient use of land, large quantities of waste, water, air pollution, and GHG emissions. The result? **Biodiversity loss, deforestation, climate change, and soil depletion.**

REGENERATIVE AGRICULTURE IS THE EVOLUTION OF ORGANIC AGRICULTURE

Building off organic practices, regenerative agriculture is thought of as the new frontier and a fundamental transition for the fashion industry. But both organic and regenerative agriculture are still considered valuable and essential sustainable solutions, which share many similarities. **Each aims to work with nature instead of against it and strives to combine the best in science with traditional practices.**

REGENERATIVE AGRICULTURE IS OUTCOME-FOCUSED WHILE ORGANIC AGRICULTURE TENDS TO BE PROCESS-FOCUSED.

Regenerative agriculture is more **outcome-focused**, aiming to maximize overall positive impact by rebalancing natural ecosystem function. This impact must be measured each year and show continual improvement. Comparatively, organic agriculture can be considered more **process-focused** by setting clear rules for how cotton (and other crops) can be grown in a more environmentally friendly and socially responsible way.

HEALTHY SOIL CAN TAKE CARE OF ITSELF BETTER THAN HUMANS CAN

For too long, we have tried to force nature to operate in a way that it's not naturally designed to. The adoption of regenerative agriculture represents a turning point. **It is an opportunity to finally honor and learn from centuries-old Indigenous and traditional management practices** that have always aimed to sustain the land and maintain harmony between its human stewards and the rest of the biosphere. This more collaborative approach is the opposite of the exploitive approach associated with today's conventional industrial model.