

Interface & Performance Business Line

TEGOTEX® RL 4050

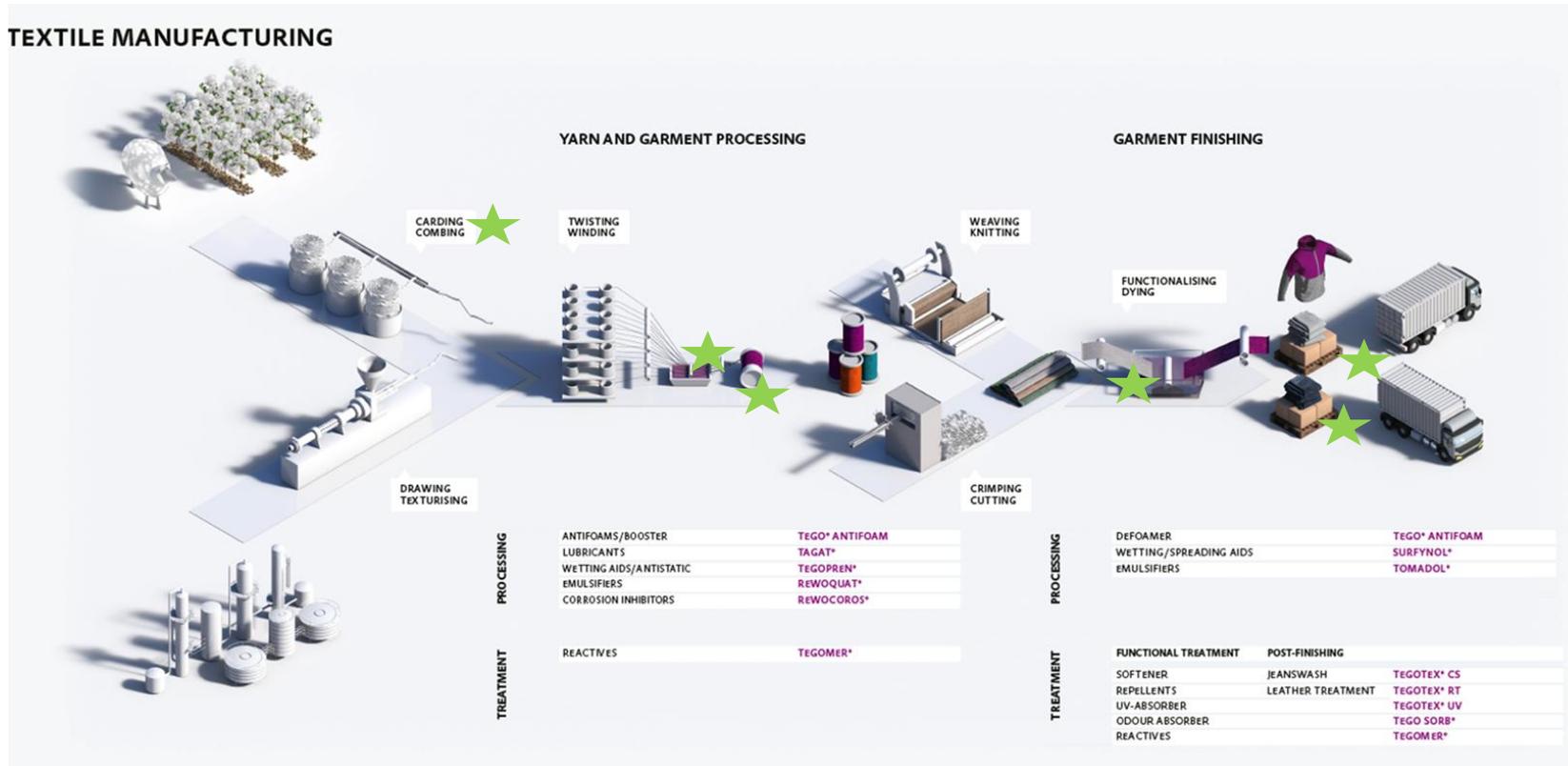
LEADING BEYOND CHEMISTRY
TO IMPROVE LIFE, TODAY AND TOMORROW

2025

<https://www.youtube.com/watch?v=YufqieuUlq4>



Textile Manufacturing: Value Chain with embedded potential surfactant use



We are strategically targeting the textile additive market, focusing on essential pretreatment applications

- scouring (impurity removal)
- desizing (polyester washing)
- general fiber wetting
- emulsification

As the textile industry evolves, the demand for innovative and sustainable solutions will become increasingly critical.

★ Potential applications of TEGOTEX® RL 4050

Trends and Drivers: The textile industry is undergoing a significant transformation driven by sustainability trends and a new ways of processing

Environmental Friendly Products



Sustainable practices, utilizing eco-friendly agents and additives

Need to reduce the ecological footprint of chemicals used in textiles

Incorporation of new technologies like enzymes in scouring processes

Waste Management



Growing demand for biobased, traceable and biodegradable products

Reduction of water and energy usage in production processes

Processes that use recycled materials and enable recycling of textiles

Health and Safety Regulations



Increased awareness of health and safety is driving the use of safer chemicals

Compliance with stricter regulations is pushing manufacturers to adopt less hazardous materials and processes

Current Solutions: Traditional products in this space primarily consist of standard surfactants that fall short of the growing sustainability expectations

	Petrochemical	Partially bio-based	Fully bio-based	Biosurfactants
Technology				
Feedstock		 		 
Examples	<ul style="list-style-type: none"> Linear alkylbenzene sulfonate Synthetic alcohol ethoxylates 	<ul style="list-style-type: none"> Alkyl Ether Sulfates Cocamidopropyl Betaine 	<ul style="list-style-type: none"> Alkyl Polyglucoside (APG) Sodium cocoyl glycinate 	<ul style="list-style-type: none"> Rhamnolipids Sophorolipids
Issues	<ul style="list-style-type: none"> Crude oil feedstock CO₂ footprint 	<ul style="list-style-type: none"> Mostly tropical oil based Often hazardous raw materials 	<ul style="list-style-type: none"> Mostly tropical oil based Often hazardous raw materials or processes Performance gaps 	<div style="border: 2px solid purple; padding: 5px; margin-top: 10px;"> <p>Evonik has emerged as first mover in the market with industrial scale production of Rhamnolipids</p> </div>

Our Solution: TEGOTEX® RL 4050. An innovative biobased and biodegradable Rhamnolipid surfactant for textile pretreatment applications

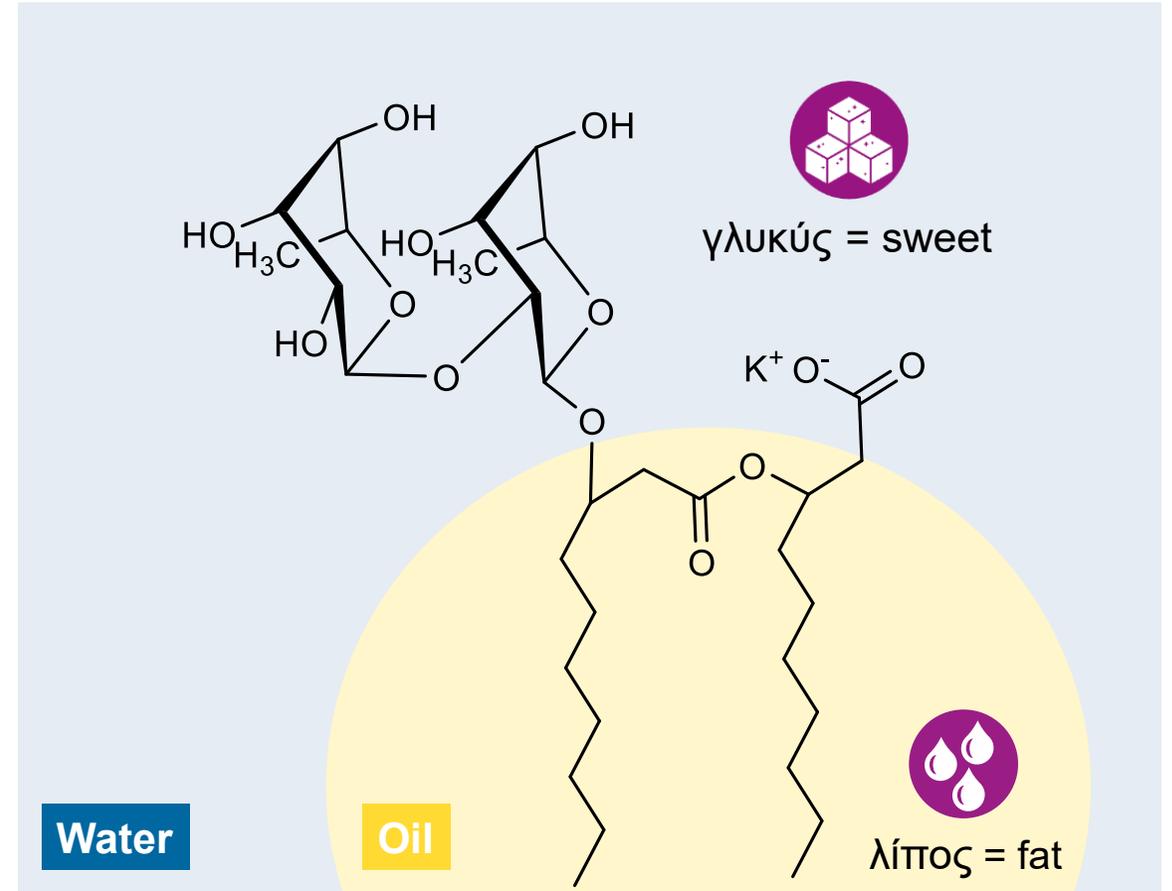
WHY

DEMAND FOR SUSTAINABLE INGREDIENTS IN THE TEXTILE MARKET

RHAMNOLIPIDS

A class of Glycolipids that combine **high surface activity** with **excellent mildness**.

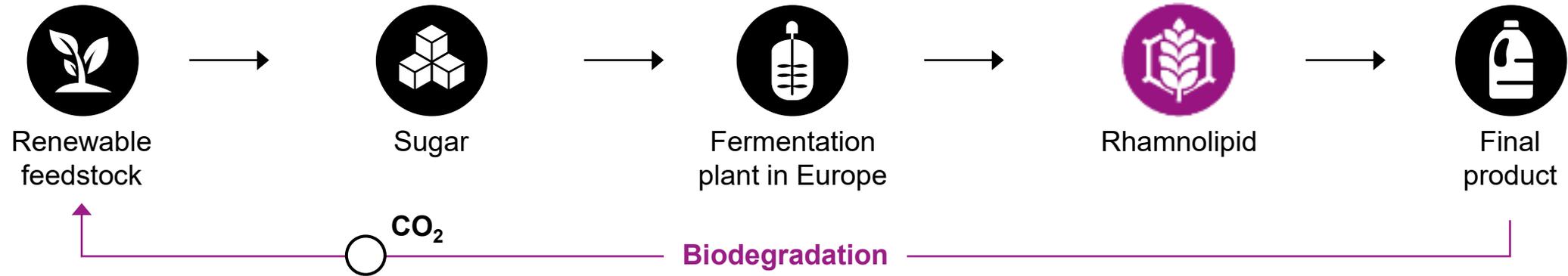
Made from renewable feedstocks, Rhamnolipids offer a sustainable alternative to synthetic surfactants thanks to their inherent biodegradability and low toxicity, alongside their environmentally friendly production process.



Sustainability Profile: Rhamnolipids

Leading the way for a sustainable portfolio transformation

Production of Rhamnolipids – Closing the carbon loop



Rhamnolipids – Performance properties

Origin	Environmental	Performance	Formulation	Added value
<ul style="list-style-type: none"> 100% renewable No tropical oils Natural ingredient Locally sourced 	<ul style="list-style-type: none"> Bio-process 100% bio-degradable Low aquatox Produced using renewable electricity 	<ul style="list-style-type: none"> High cleansing/ degreasing due to excellent wetting and emulsifying properties Hard water tolerant 	<ul style="list-style-type: none"> Aqueous solution, easy to formulate Concentrate with 50% active matter System solution 	<ul style="list-style-type: none"> Mild to fibers and skin Pleasant skin feel Safe for workers in production

Performance Excellence: TEGOTEX® RL 4050 Product Properties

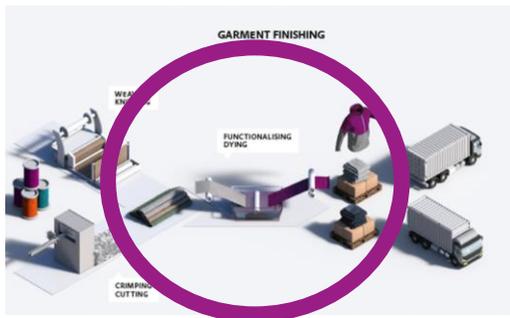
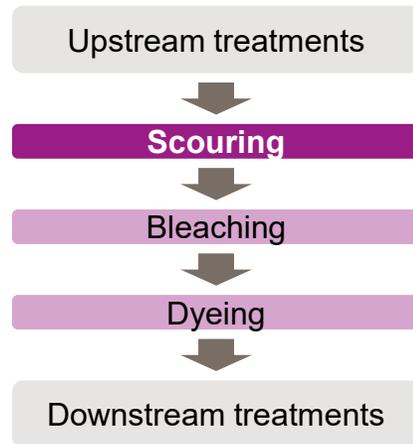
TEGOTEX® RL 4050

Rhamnolipid

Aggregate state	Liquid, yellowish
Compatibility	Compatible with enzymes, anionics, nonionics and Amphoteric
Solubility	Water soluble at pH > 5.0
Hard water tolerance	not affected up to 70 °dH
Active content	~50 %
Stability	Stable at pH 5.5 – 10
Processing	Cold processable, easy to handle
Surface tension, Surface tension pH dependent	<ul style="list-style-type: none"> ▪ pH 5.5: 28 mN/m ▪ pH 9.0: 34 mN/m
CMC [g/L]	<ul style="list-style-type: none"> ▪ pH 5.5: 0.02 ▪ pH 9.0: 0.04



TEGOTEX® RL 4050 shows excellent performance in bio scouring, a sustainable alternative to classical harsh alkaline scouring



ALKALINE SCOURING

Conditions

- 90°C
- 60 minutes
- pH 12

Formulation

- Ethoxylated surfactants
- Solvents
- **Caustic soda**

BIO SCOURING

Conditions

- 50°C
- 40 minutes
- pH 8

Formulation

- **TEGOTEX® RL 4050**
- **Enzyme** (pectinase)

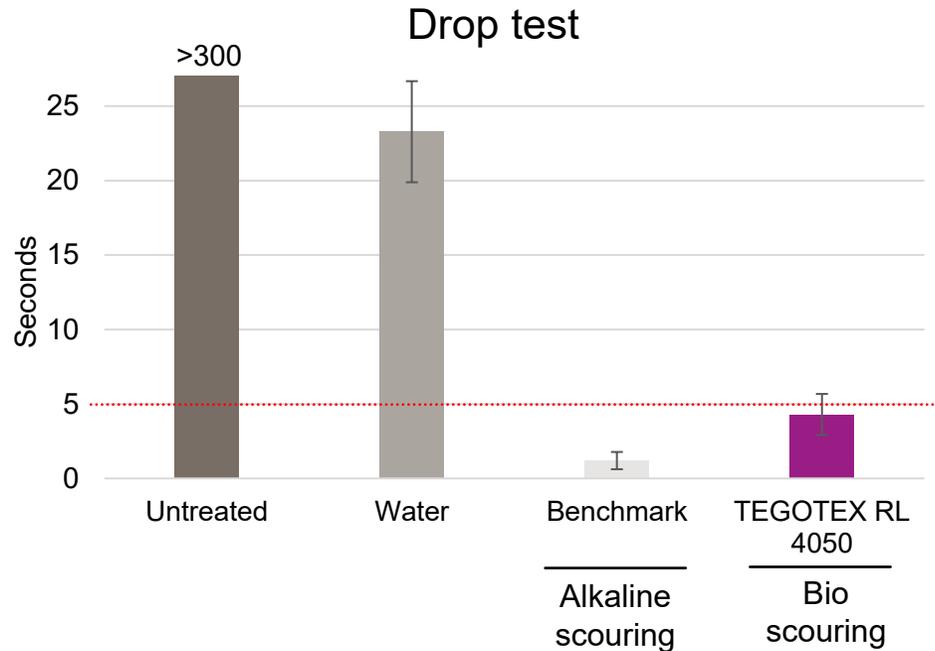
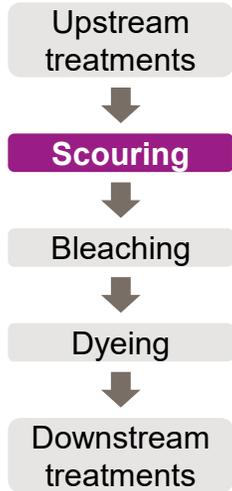
HANDPRINT

- **78%** Less energy usage due to reduced heating requirements
- This translates into **73%** CO₂ savings based on european grid mix.
- Less chemicals usage
- Less effluent treatment
- Improved fabric quality

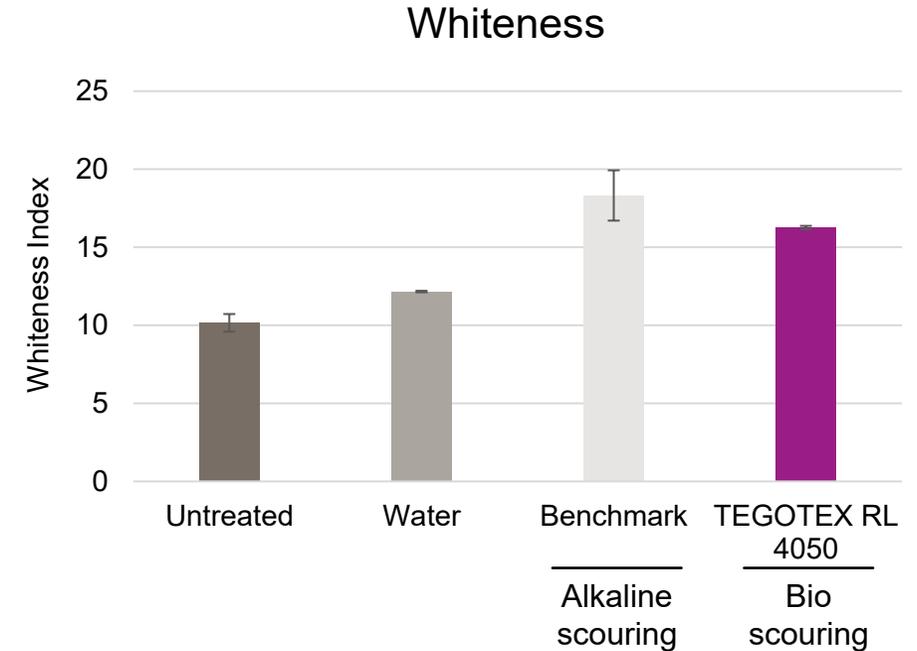


Bio Scouring is gaining momentum as sustainability demands grow.
TEGOTEX® RL 4050 enables efficient scouring at lower pH and temperatures.

Bio scouring with TEGOTEX® RL 4050 meets the performance needs

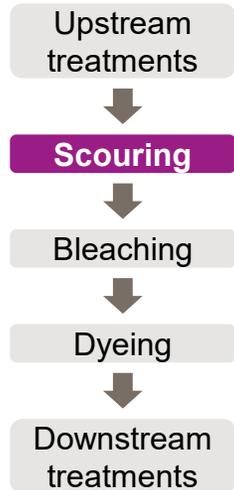


TEGOTEX® RL 4050 improves the absorbency and wettability of textile fabrics by removing hydrophobic impurities, as evidenced by faster absorption of liquid drops within the desired limits of < 5 seconds



TEGOTEX® RL 4050 increases the whiteness of cotton after scouring indicating effective removal of natural colorants, waxes, and impurities, resulting in a cleaner, brighter fabric surface suitable for dyeing and finishing

Handprint evaluation of TEGOTEX® RL 4050 in Bioscouring



Evonik solution:

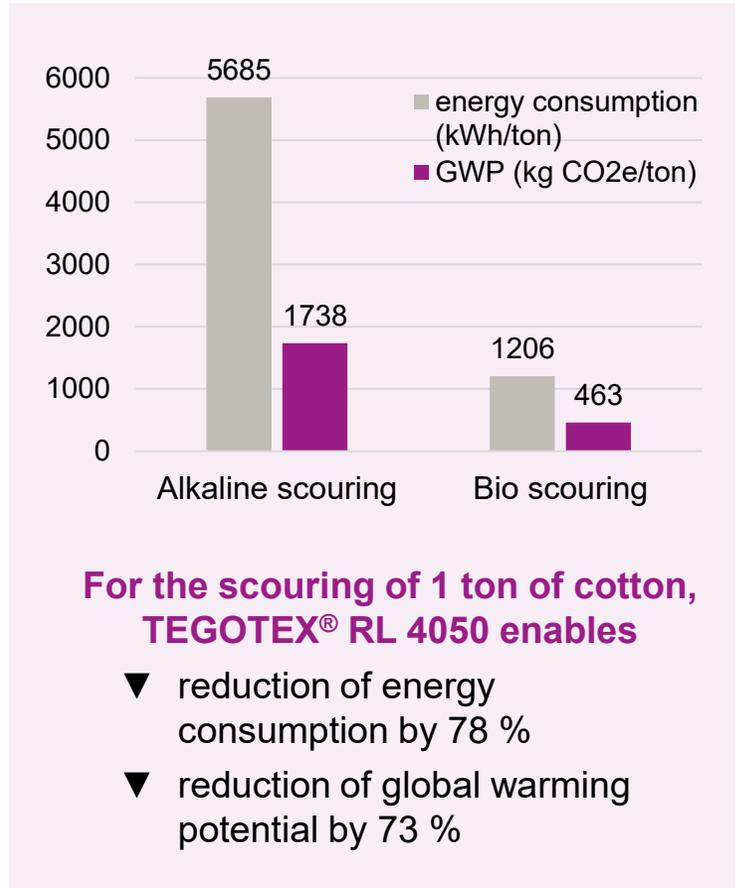
- Bio-scouring using TEGOTEX® RL 4050 and enzymes at pH 8 is carried out at moderate temperature with a shorter process time.

Standard solution:

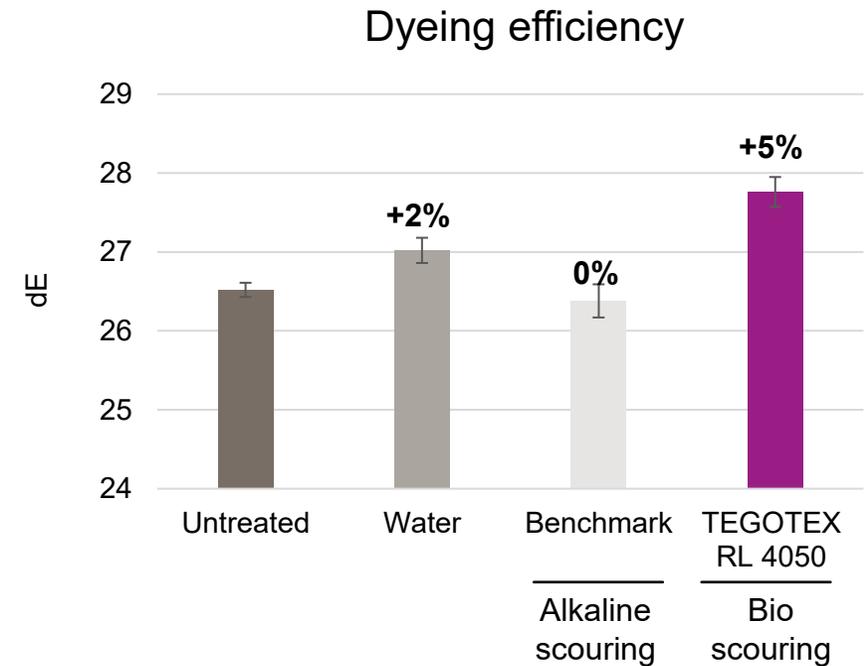
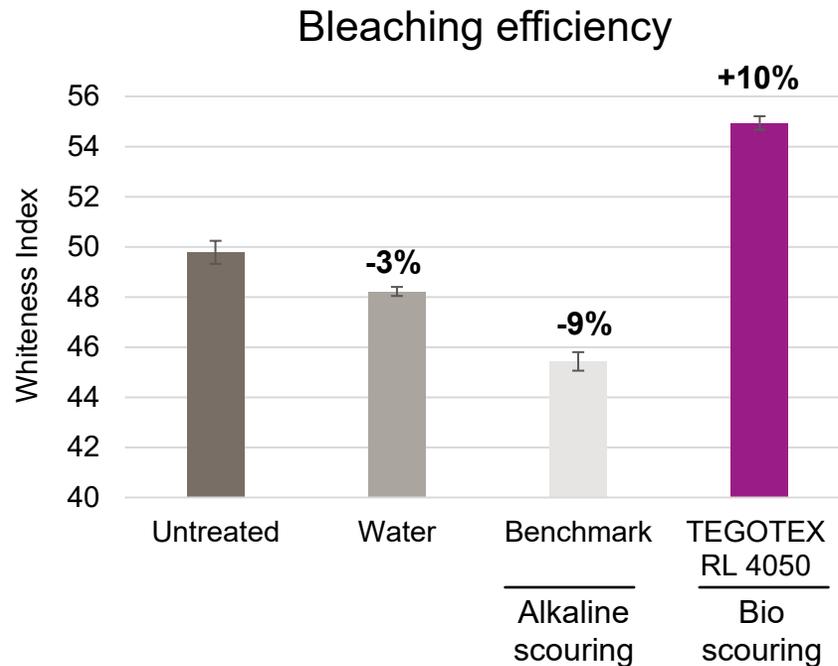
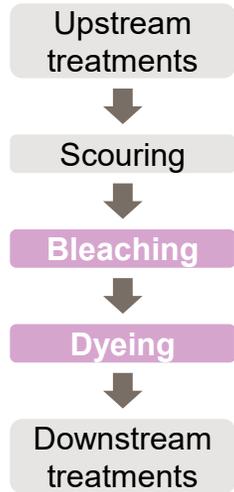
- The industry standard is alkaline scouring with ethoxylated wetting agents at pH 12 under high temperature

Handprint calculation:

- The handprint calculation quantifies the reduced energy consumption and avoided GWP emissions (global warming potential) for a new process like bio scouring in comparison to an existing standard process like alkaline scouring.
- Handprint assessment is an integral part of our sustainability analysis calculating sustainability benefits.
- Differences are derived from reduction of energy demand and alternatively used raw materials quantified via comparative LCA (Life Cycle Analysis / DIN ISO 14040/44).



Bio scouring with TEGOTEX® RL 4050 enables excellent bleaching and dyeing of cotton, outperforming what harsh alkaline treatment can achieve



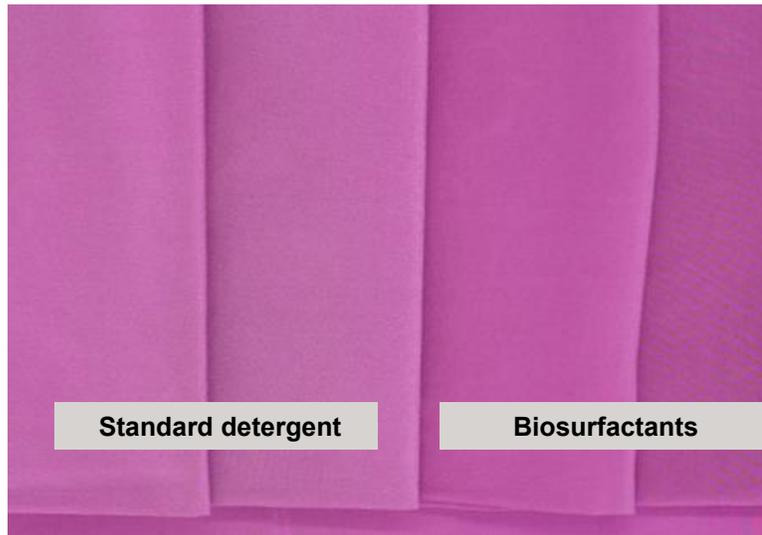
Bleaching of fabrics pretreated with **TEGOTEX® RL 4050** increases the whiteness further, confirming the effective removal of impurities. Less damage to the fiber results in a brighter, more uniform surface for dyeing and finishing.

TEGOTEX® RL 4050 pretreatment gently prepares fabrics, enabling deeper dye penetration and more intense coloration by superior dye uptake compared to conventional methods.

Performance Excellence: Textile Cleaning Applications with Rhamnolipids

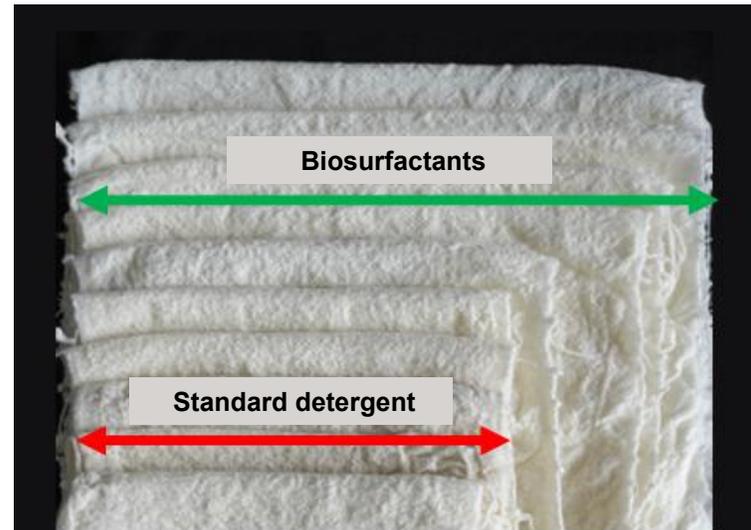
Downstream benefits beyond textile manufacturing - laundry care

Premium color care



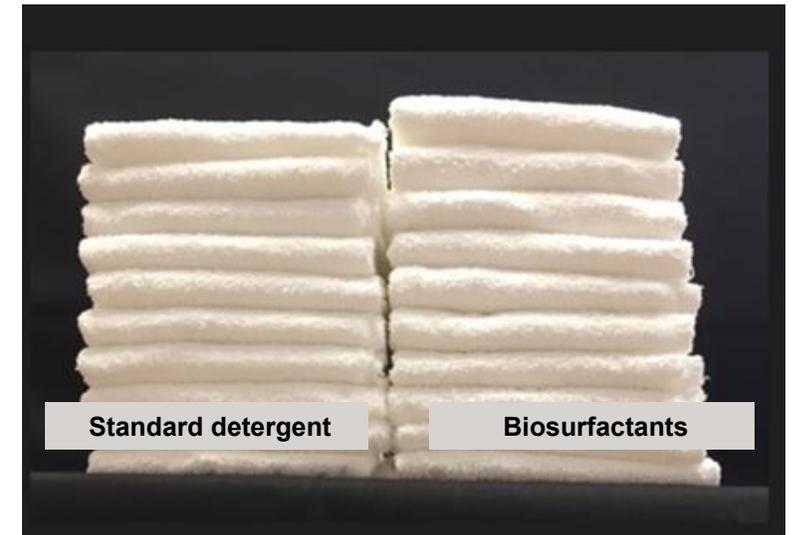
After 15 washes at 30 °C, colored silk fabric washed with Rhamnolipid-based detergent retains better color compared to the benchmark detergent

Less shrinkage of wool



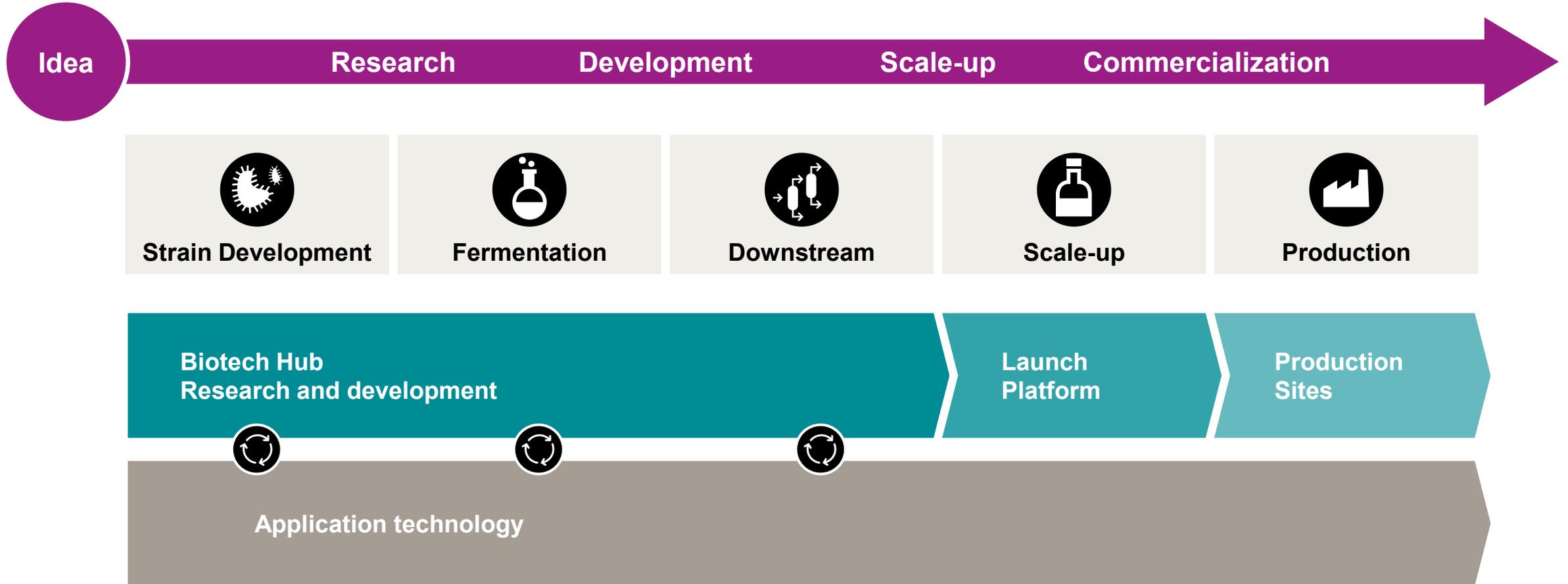
Wool washed with Rhamnolipid-based detergent shows less shrinkage after 5 washes at 40 °C compared to the benchmark detergent.

Fluffy towels



Terry towel fabric shows increased fluffiness after 5 washes with Rhamnolipid-based detergent compared to the benchmark

Production Excellence: Key to success are multiple competences along research, process development, scale-up, and production



Production Excellence: Our proprietary Rhamnolipids are produced through an innovative biotechnological process at our Fermas fermentation plant

Company Jan 14, 2022

EVONIK BUILDS WORLD'S FIRST INDUSTRIAL-SCALE PRODUCTION PLANT FOR RHAMNOLIPIDS



Evonik is investing a three-digit million-euro sum in the construction of a new production plant for bio-based and fully biodegradable rhamnolipids. ... MORE



Unilever and Evonik partner to launch green cleaning ingredient

Published: 18 December 2019 Average read time: 2 minutes

London/Rotterdam - Unilever, in partnership with speciality chemicals company Evonik, has harnessed a naturally occurring process and turned it into a renewable ingredient; Rhamnolipid.



Together, we can create a cleaner, greener future for textiles!

PEOPLE
**NEXT
GENERATION
CULTURE**



OUR HEARTPRINT

LEADING
BEYOND CHEMISTRY
TO IMPROVE LIFE,
TODAY AND
TOMORROW

MARKETS
**NEXT
GENERATION
SOLUTIONS**



OUR HANDPRINT

ASSETS
**NEXT
GENERATION
TECHNOLOGIES**



OUR FOOTPRINT





EVONIK

Leading Beyond Chemistry