Soliance - Sophoclean

The first industrial biosurfactant

24.11.2015 Adebiotech

Givaudan

engage your senses

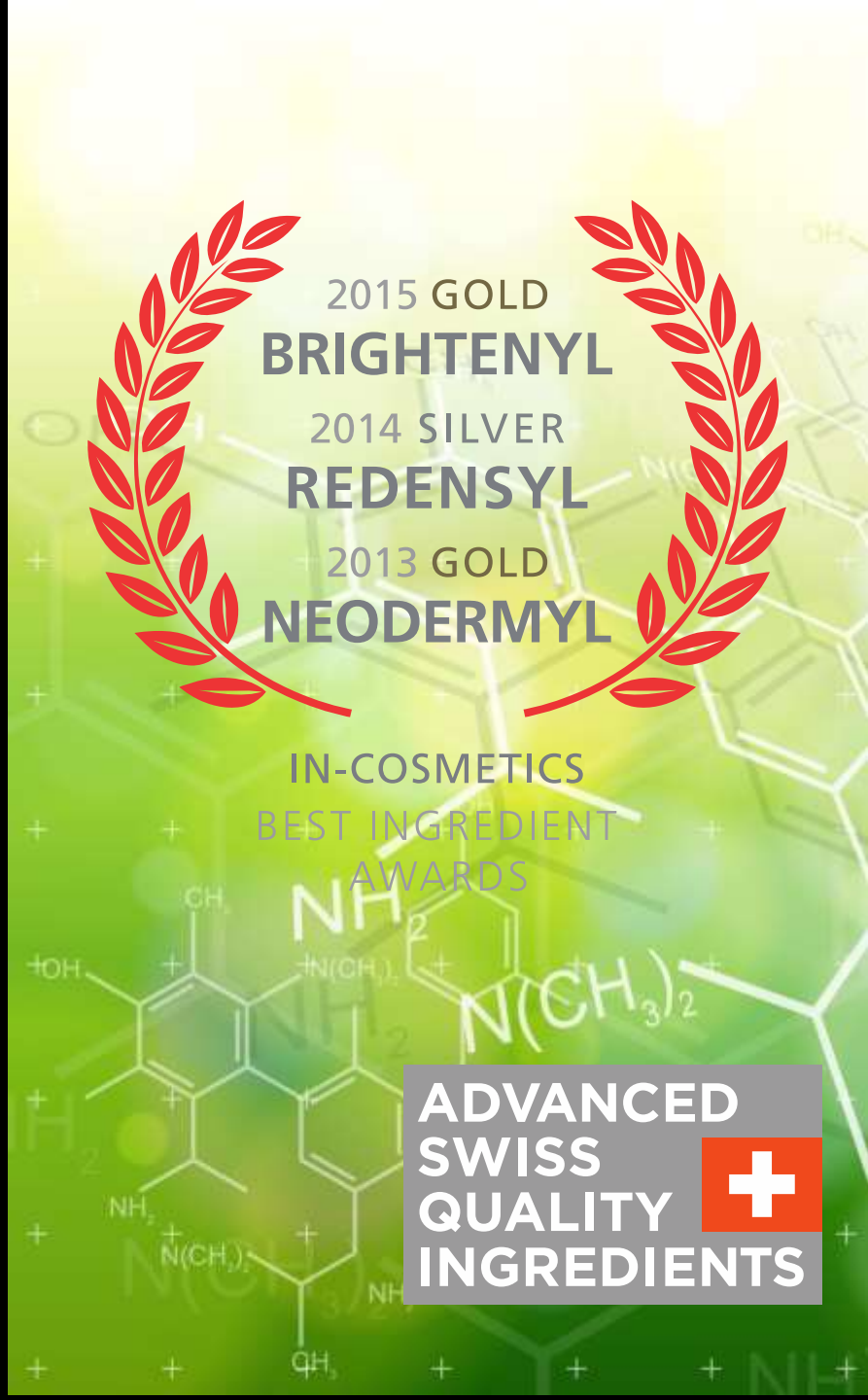
Active cosmetic ingredients
Soliance & Induchem part of GIVAUDAN

2014
Turnover
CHF 55 M

10%
turnover
in R&D

Soliance
acquired in
2014
Induchem
in 2015

~185
employees,
av. age
35 y.o



Enabling technologies
Design of innovative & efficient active ingredients

White biotechnology

Technologies :
Fermentation
Biocatalysis

Creating value from biosourced materials

Green biotechnology

Technologies :
Extraction
Fractionation
Green Chemistry

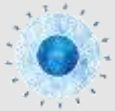
Creating value from plant diversity

Blue biotechnology

Technologies :
Marine Biotechnology
Microalgae culture
Extraction

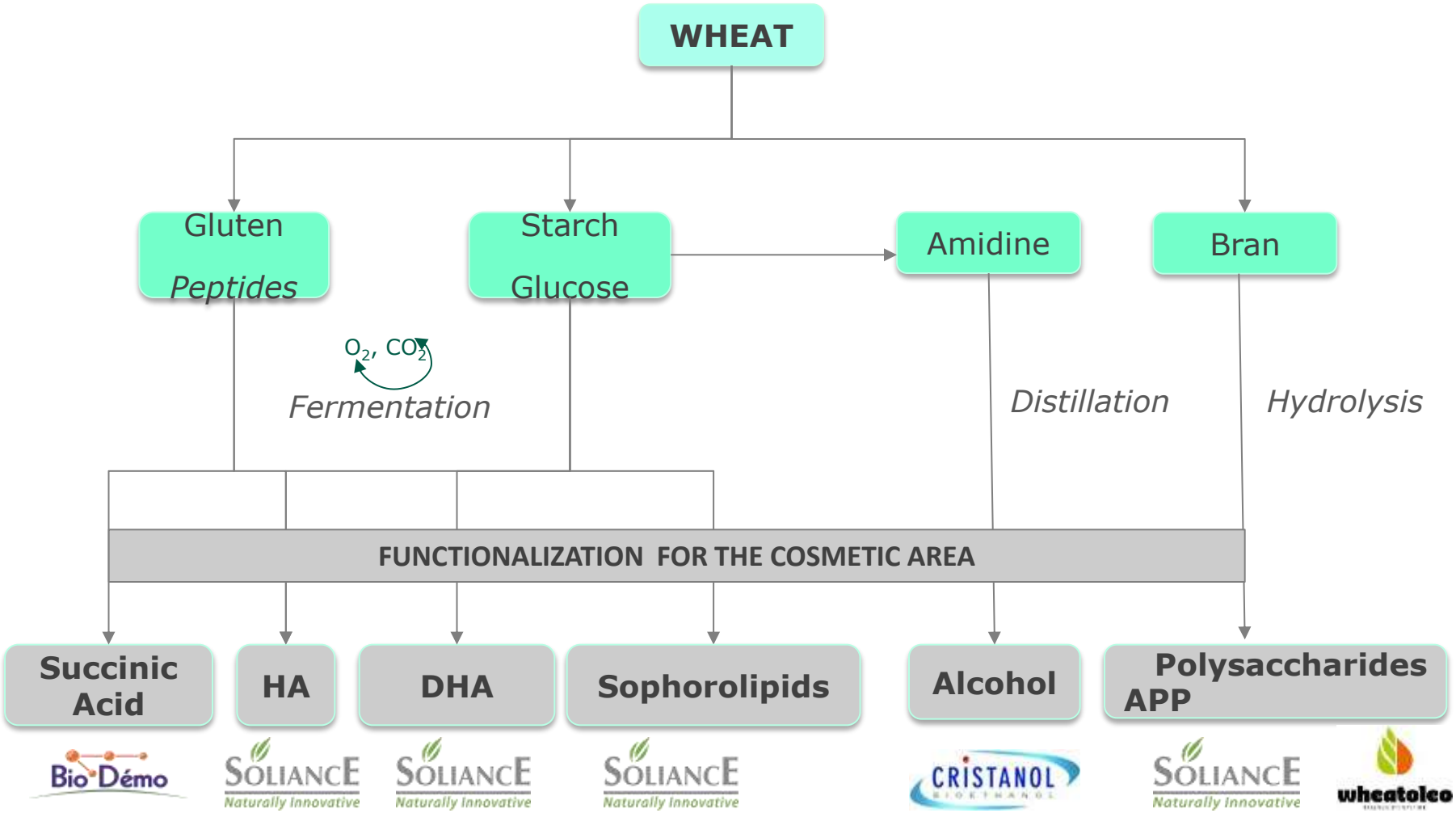
Creating value from marine diversity

Specific technologies & development
Spherulites, cooling technology + Biocatalyse & metagenomic



Vegetable cracking

Raw material functionalization



Development for a sustainable planet
An environmental context

In response to a growing environmental awareness, Soliance has launched Sophoclean, a biosurfactant produced according to the Biorefining Concept and traceability.

Surfactant: a global mass business

- 15 to 18 MT the global use of Surfactant
  - ==> 8,5 Mt for detergency and Laundry
  - ==> 1,5 Mt for cosmetic use
  - ==> 1 Mt for agricultural use
  - ==> 5 Mt for technical use

➔ Main topic

Toxicity & ecotox issue & use of renewable and biodegradable ressources

Development for a sustainable planet
A growing demand

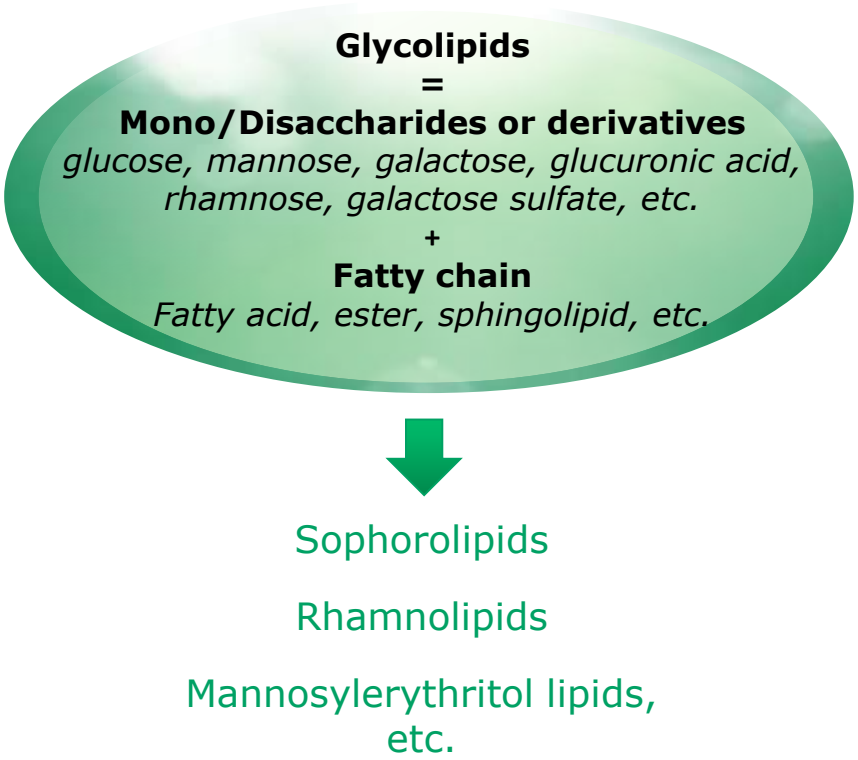
Choice of raw materials
- *Renewable/local resources*
- *Biotechnological processes*
- *No chemical processes*

Ecological impact
- *Low levels of water used*
- *Effective in hard water*
- *Machine wash cold*
- *Easy to rinse*

Acceptability
- *Low toxicity/ecotoxicity*
- *Easily biodegradable*
- *Compatible with the pH of living organisms*
- *Soft on skin*

By its bio-composition and its properties, Sophoclean has a low ecological impact.

Discovering Sophoclean
Glycolipids, naturally occurring surfactants



Glycolipids are biosurfactants that are naturally present in living organisms and produced by micro-organisms from vegetable materials.

They are structurally diverse depending on the micro-organism and the substrates employed in the bioprocess and the fermentation.

Sophoclean is a solution with a high concentration of sophorolipids.

Discovering Sophoclean
Discovering Sophorolipids

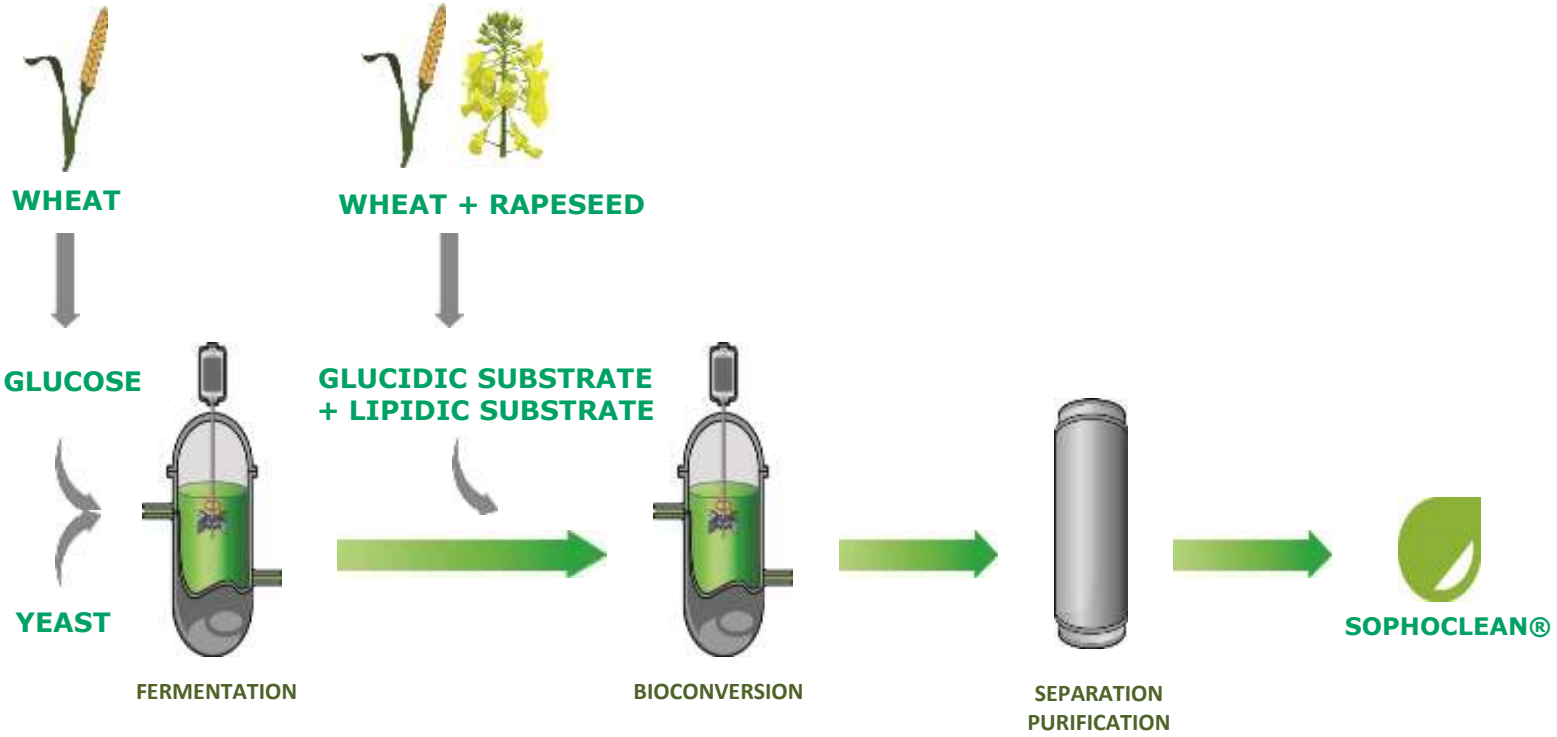
Around 40 years ago, the research team led by Spencer discovered an as-yet unknown yeast, Candida bombicola, at the heart of a the petals of a wild flower called Sonchus oleraceus.

By continuing their research on the novelty of this yeast, they discovered that it is capable of naturally synthesizing sophorolipids.

In the 1990s, Soliance carried out research on this plant for its sap and its emulsifying properties, also taking an interest in this strain for its high capacity for producing these natural surfactants.

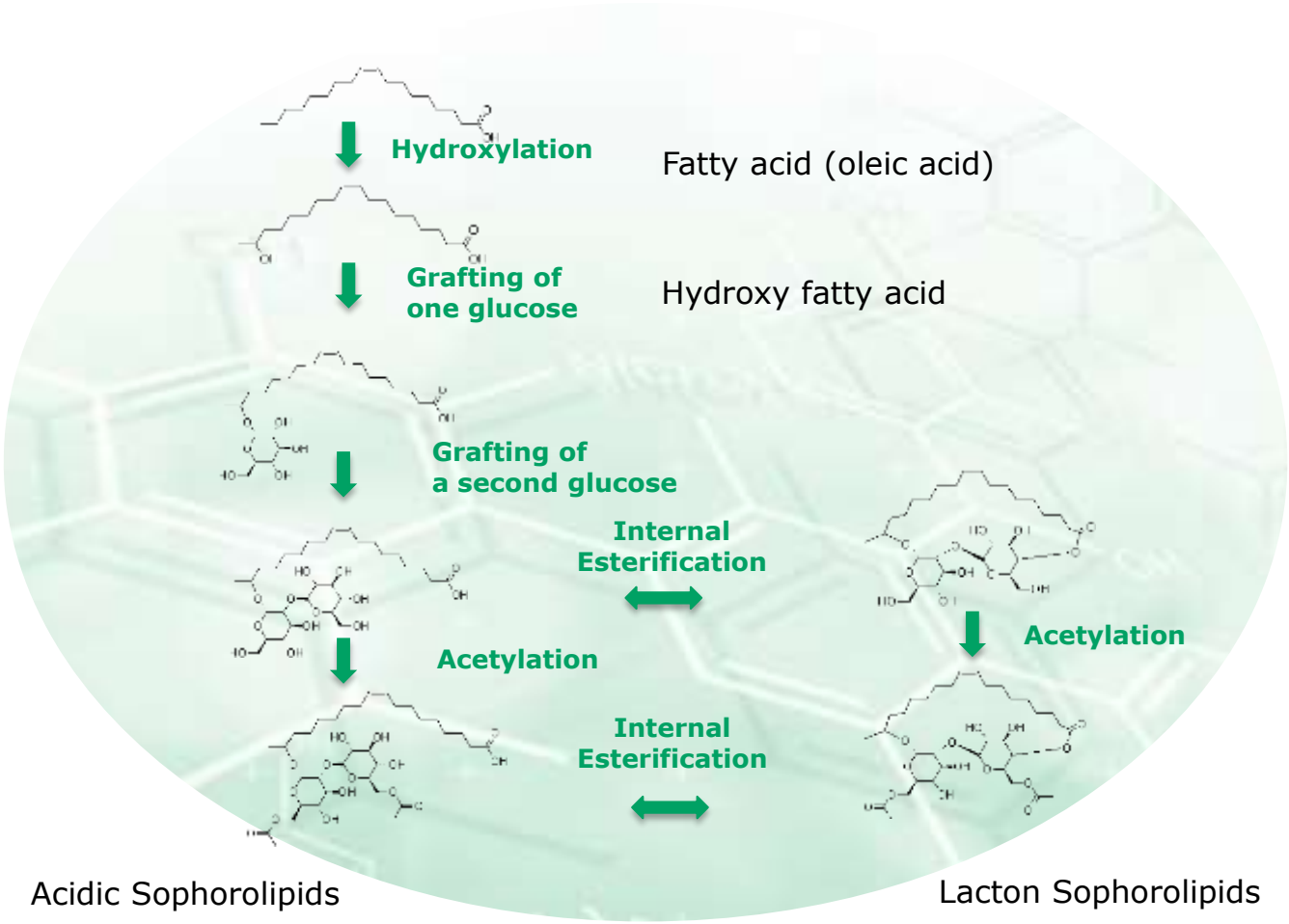
The secret of a responsible production process

A process developed in Europe's first plant Biorefinery



Sophoclean is the first surfactant locally bio-sourced.

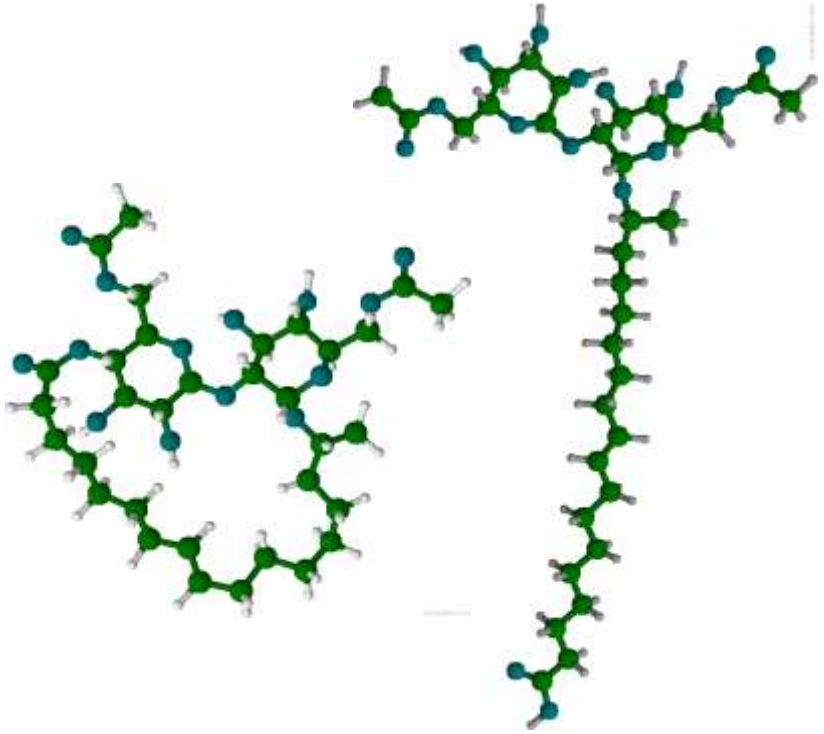
Sophoclean biosynthesis pathway
Theoretical pathway



Sophoclean biosynthesis pathway
Composition of Sophoclean

Properties	Sophoclean
Lipidic chain	C16-C18
Appearance	Amber liquid
Dry matter (DM)	50-60%
Active matter	> 80% DM
Native pH	3-6 (20°C)
Storage temperature	20°C

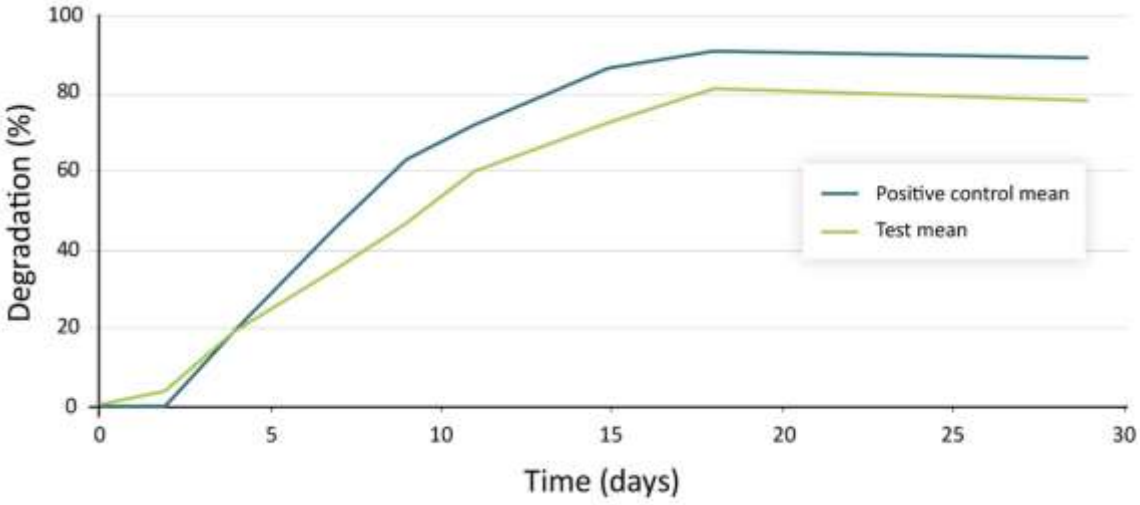
Fluid solution (non-viscous),
easily transferable



(a) Lacton form **(b) Acidic form**

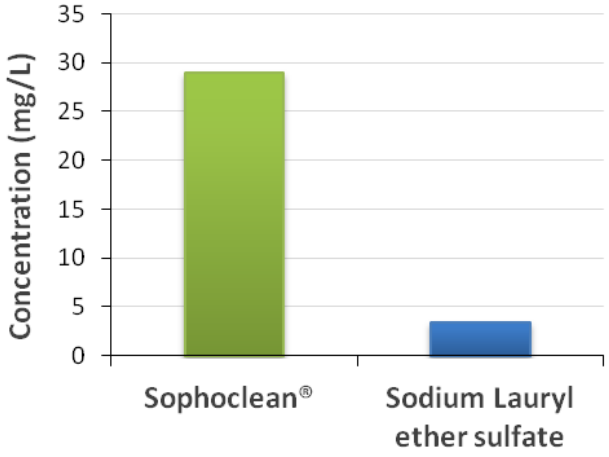
Sophoclean is the first industrial bio-surfactant produced naturally using bio-technologies.

Sophoclean biosynthesis pathway
Biodegradation and Ecotoxicity



OECD 301B Directive.

After 28 days, Sophoclean is 77% degraded.



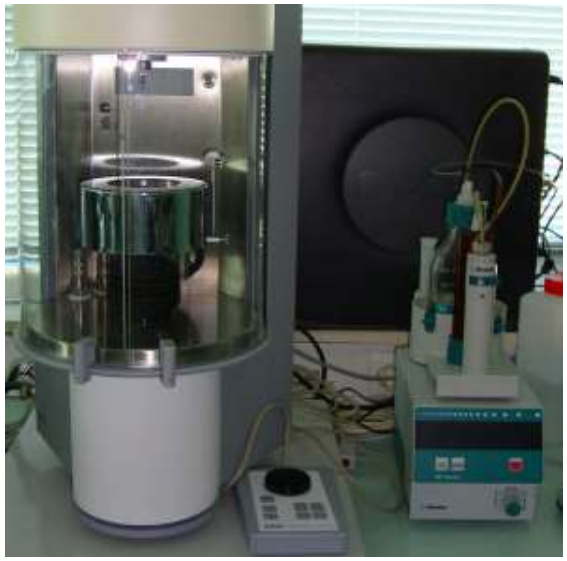
OECD 202 Directive.

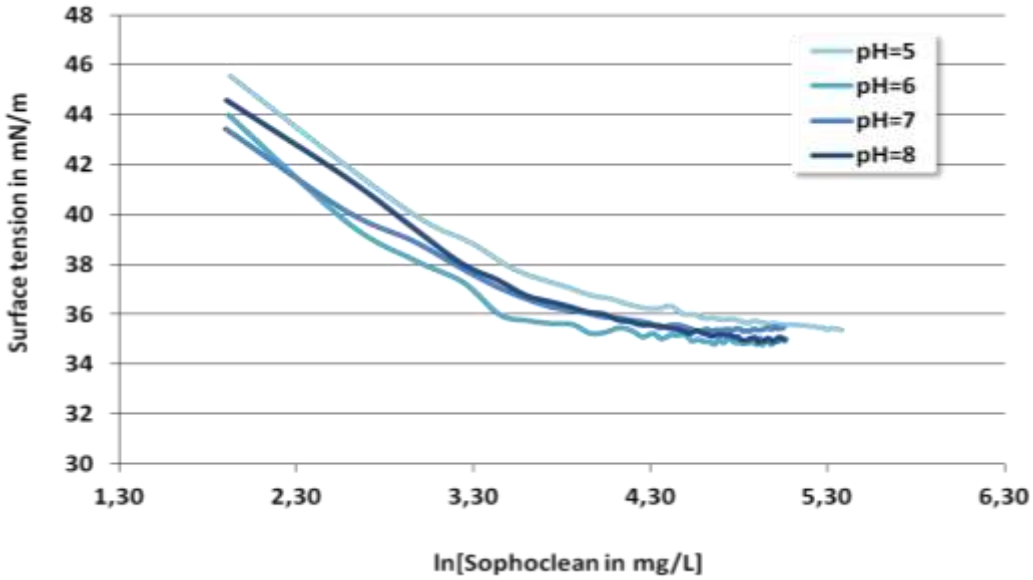
Minimum concentration immobilising half of the *Daphnia magna* population(ECi50/48h).

Sophoclean is readily biodegradable and has less impact on aquatic life.

Natural performance
Lowering of the surface tension

Measurement at CMC (25°C, Krüss K100 processor tensiometer)



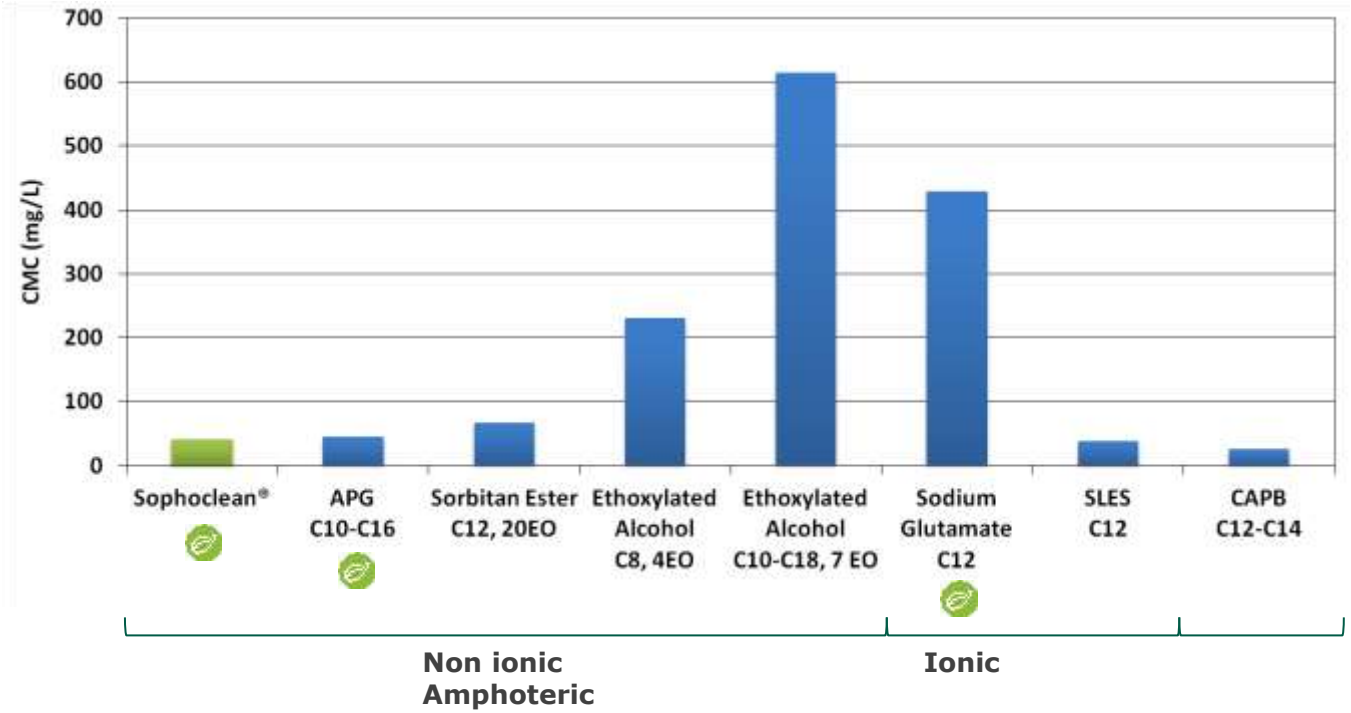


- CMC between **30 and 50 mg/L**.
- Surface tension at the CMC between **34 and 36 mN/m**.
- Reduction of the surface tension **not dependent on the pH**.

The extremely low values of the CMC mean Sophoclean can be classified as a high-performance surfactant.

Natural performance
CMC measurement

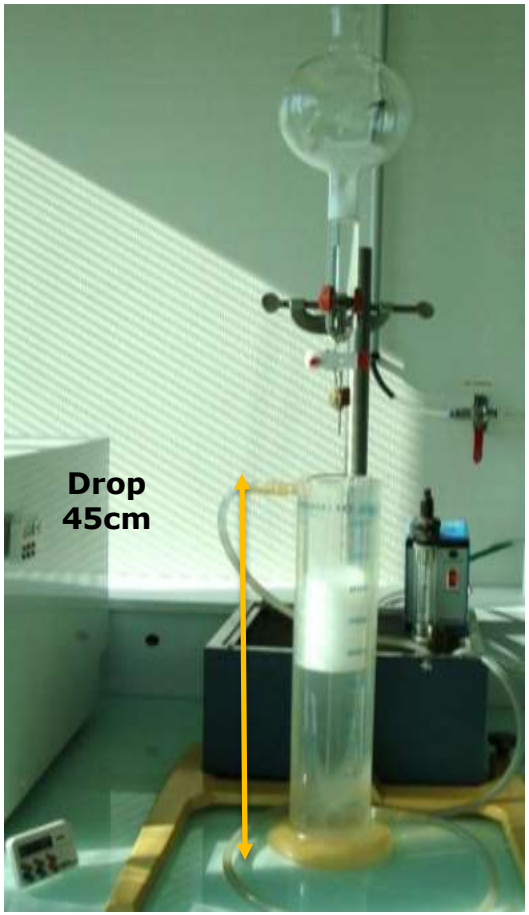
Measurement of the CMC at pH6 (25°C, 50 mmol NaCl)



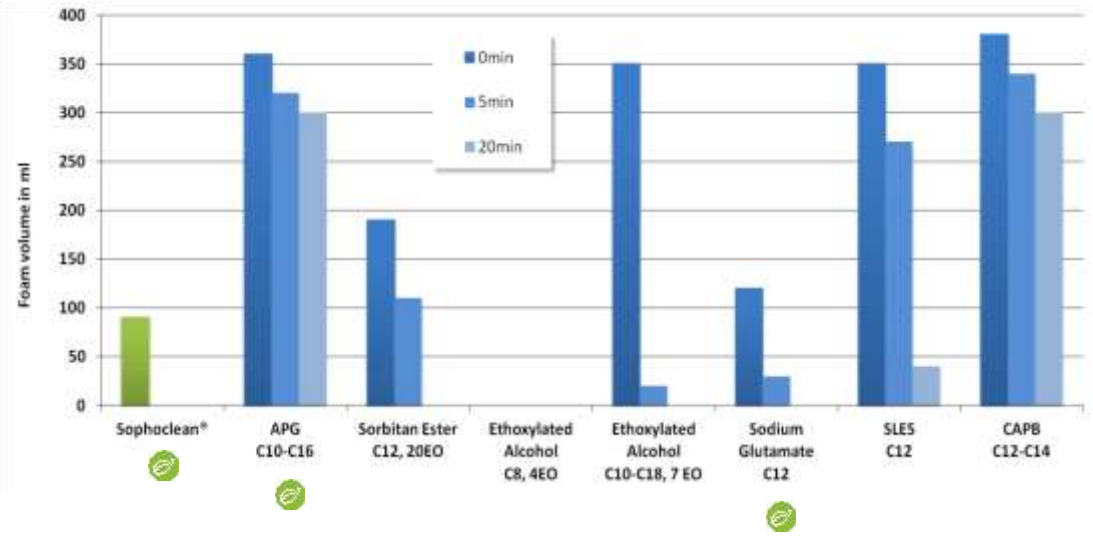
Sophoclean has the lowest CMC of all non-ionic surfactants and green surfactants.

Natural performance
Foaming power

Ross Miles Protocol - Measurement at pH6 (50°C, demineralised water solution)



This method consists of pouring 500 ml of 0.1% surfactant solution onto 50 ml of this same solution. The volume of foam created and its stability are measured over time.

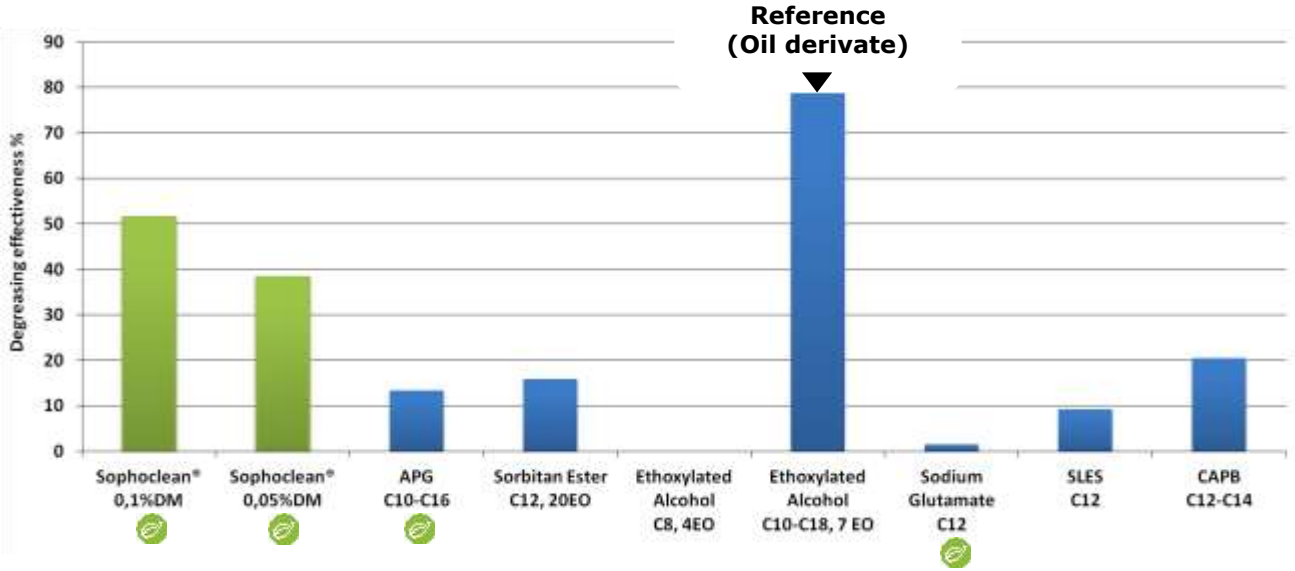


Sophoclean has a low foaming power. The volume of foam is lower than 100 ml. The foam completely disappears in less than 5 minutes.

Natural performance
Sophoclean, the first degreasing surfactant 1/2

Degreasing test on stainless steel - pH6 (25°C, demineralised water solution)

The stain is composed of the following mixture: 79% of engine oil, 20% of petroleum wax and 1% of Sudan red. 0.1% of surfactant (MS) at 40°C. 30 minutes. The plates are rinsed and left to dry in a vacuum for 1 hour at room temperature.

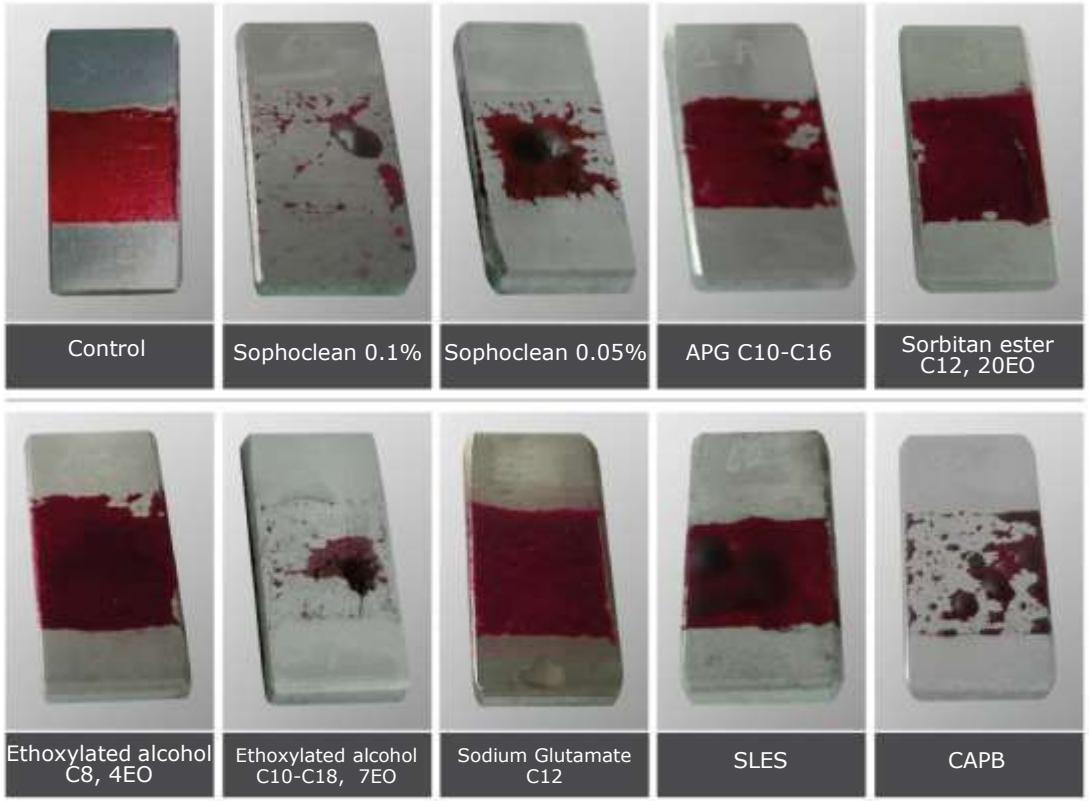


Sophoclean has the best degreasing performance of the green surfactants.

Natural performance
Sophoclean, the first degreasing surfactant 2/2

Degreasing test on stainless steel - pH6 (25°C, demineralised water solution)

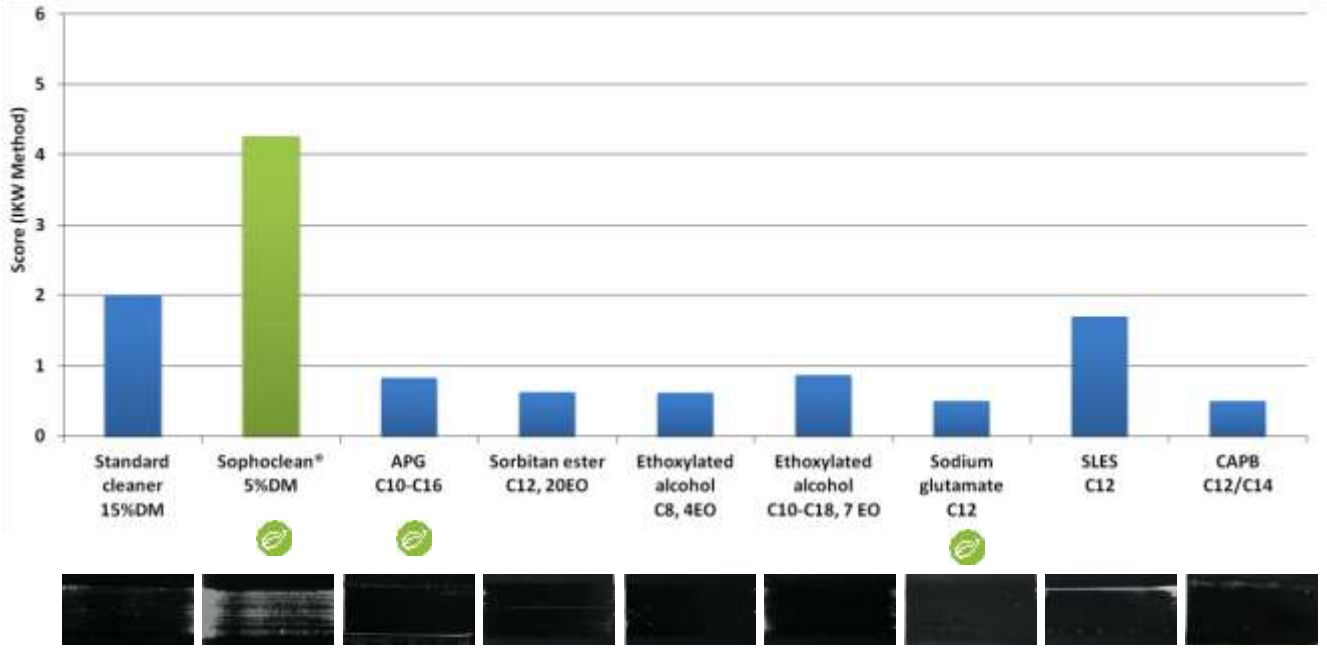
Results of the appearance of the plates after degreasing in a solution of 0.1% surfactant (exception for 0.05% Sophoclean):



Sophoclean is visibly more degreasing than the reference green surfactants.

Performance
Cleaning power on hard surfaces

Comparison of the cleaning effectiveness of each surfactant at 5%DM and pH7.5



pH is adjusted with TEA or citric acid.

Sophoclean has a better cleaning effectiveness on hard surfaces than the other surfactants.

Performance
Sophoclean Application

Sophoclean is a biotensioactif

- low foaming,
- strongly degreasing,
- quickly wetting, with a very low CMC.

These properties favours its use in applications like:

- machine detergents (dishwasher, washing machine)
- multi-surface cleaning products,
- I&I detergents (institutions and local authorities need, «Carwash», pleasure boats).




Natural performance
Lifecycle management

Selection of raw materials

- Renewable plant sources
- Plants harvested locally
- Less transport, less CO_2
- Traceability/safety/reliability
- Produced through biorefining

Ecoproduction of Sophoclean

- No solvents
- No catalysts
- Highly efficient
- No chemical processes
- Biotechnological process

Management of finished product

- Easy to rinse
- Little water required to rinse
- Easily biodegradable
- Low ecotoxicity
- Good acceptability
- Non irritant/non drying for the skin

A green alternative for your formulas.

Very low foaming power.

Proven degreasing effectiveness, even with less detergent.

High wetting power

Very low CMC.

Cost effective

Thank you

Soliance – Alexis RANNOU
The first industrial biosurfactant