

Sustainable Evolution of Natural Ingredients

Sunflower-based Circular Economy for a new Era of Cosmetics

By Alessandra Adduci* and Stefania Zanzottera**

Abstract

Growing interest is ever more evident in the research of conscientious cosmetic formulas able to prove a minor impact on the Planet. Primary attention operated by end users in the purchasing behavior is focused on the sustainable profile of finished formulas that, obviously could not forget the selection of active and functional ingredients characterized by “eco-friendly” character. The main objective of this paper is to present the development of a series of ethical ingredients, designed to operate a sustainable revolution for the future of Beauty industry, by showing the evidence of circular economy models effectiveness towards a sunflower-based production process aiming at developing various functional ingredients.

Key words: bio-economy, sustainability, sunflower, emollients, surfactants, emulsifiers



Introduction

“Sustainable development” is a demand that businesses must embrace sooner or later in order to be successful and even viable in the longer term. At present, it is not an obligation, but it is certainly an opportunity¹.

Sustainability strategies are no longer just the preserve of niche companies but a new global consciousness that aims to encompass social, environmental and economic value.

Actually an evolution of beauty from “green” to “clean” to “conscious”, describes as today consumers’ beauty view not only takes a personalized approach to understanding skin types, but consumers also evaluate the wider ethical and environmental impact of a purchase with the same gravity as personal priorities, with credentials such as safety, transparency and ethical sourcing often being prioritized.

In this background younger consumers and beauty enthusiasts are key drivers. Younger generations are driving the industry push for sustainable beauty. There seems to be more consistency in the growing importance of sustainable features in beauty among Generation Z, Millennials and Generation X than among Baby Boomers. The skin care category has the highest penetration of sustainable/ethical claims out of all beauty and personal care categories, while claims have notably increased in color cosmetics, hair care, and bath and shower.

While the development of sustainable initiatives may have been postponed due to COVID-19, the forecast period offers significant opportunities for technological advances in sustainable innovations. Sustainable products and recycling are expected to be the main future areas of investment for beauty and personal care players, continuing the trend of the past five years. Moreover, the beauty industry worldwide seems to be making serious efforts to incorporate sustainability as a core pillar in the long term, rather than using it to introduce novelty².

Sunflower-derived functional Cosmetic Ingredients

As a pioneer on sustainability-driven innovations, the company ROELMI HPC strictly adopts an approach directed to environmental preservation, towards the biodiversity safeguard and the use of renewable sources. All those drivers are collected together to concretely live the market following our N.I.P.[®] program.

Following the principles of sustainable development, the company concurs to provide the most advanced actions towards the future where high value ingredients represent the core of innovation. Together, it opens technological partnerships with industrial key players permitting new value for cosmetic & nutraceutical market. Beside the biotechnological expertise, the Company adopts circular economy model in several product developments, following its own vision that is intended to put in place second-generation supply chains.

* LProduct Manager

** Marketing Manager, ROELMI HPC, Italy

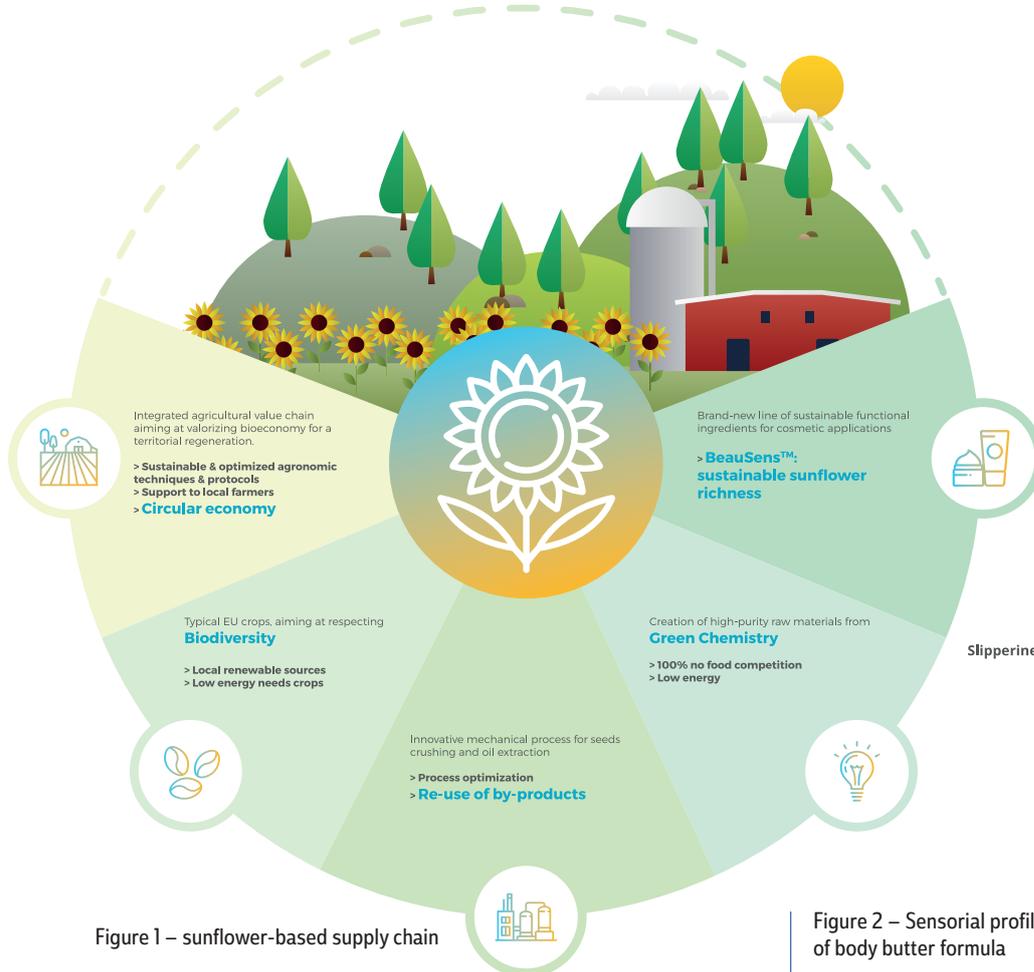


Figure 1 – sunflower-based supply chain

This is the context in which the company is pleased to present the brand-new line of sustainable functional ingredients for cosmetic applications.

Starting from Sunflower Seed Oil (no GMO) and following a Mediterranean-based circular economy model, natural derived raw materials embrace innovation attitude to create beauty breakthrough ingredients (Figure 1).

Drought tolerance, due to a deep root system, together with no use of chemical fertilizer or herbicides, make sunflower a sustainable vegetal source easy to cultivate with good crop yield. Produced at large scale in a limited number of countries, two thirds of the production of this crop are concentrated in Europe. Raw materials coming from EU crops, cultivated following the most advanced agronomic techniques to preserve local biodiversity, are involved to develop ethical ingredients targeting the future of Beauty, driven by innovation and inspired by a more equitable, inclusive and sustainable model of production.

In full respect of biodiversity, working with low-energy extraction processes, sunflower, source of essential fatty acids (mainly linoleic acid and oleic acid) provides the keys to begin a circular development which integrates the principles of green chemistry ensuring a low environmental impact.

A sustainable cutting-edge technology combining nature and innovation is composed by a mechanical soft extraction of Pelargonic Acid from sunflower seed oil allowing the integration of green chemistry principles for the creation of a skin-friendly cosmetic ingredient.

A fascinating project that at the end delivers exclusive ingredients for the new generation of eco-friendly cosmetics to preserve skin natural ecosystem by dermocompatible compounds, *BeauSens® Line*. It is composed by: (i) lightweight emollient ester, (ii) oil-in-water emulsifier and (iii) mild surfactant.

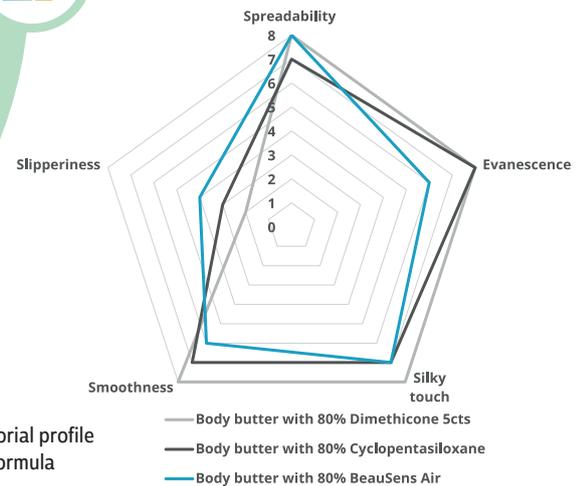


Figure 2 – Sensorial profile of body butter formula

Lightweight Emollient Ester

BeauSens® Air (INCI: *Ethylhexyl Pelargonate*) is a natural derived emollient ester with extraordinary texturizing properties and evanescent feel.

More than an alternative to common esters, *BeauSens® Air* is the reliable choice for formulators looking at sustainability as main driver of future: an ultra-light and dry skin feel emollient particularly suitable for face, body and hair care applications.

Due to its great “dry touch” effect, it leaves a clean, lightweight, nude skin feel with no residue and a matt finish on the skin. It can be applied in the sunscreen market to improve the sensory touch from an oily and greasy perception on skin towards an improved and appealing skin feel. Dry touch is important for consumers with oily or combination skin who want a lightweight, refreshing product that can be absorbed quickly for a natural-looking finish. *BeauSens® Air* is also indicated for color cosmetic formulas where its “color boost” effect places the focus on vibrant colors, decreasing application time through quick spreading with good pay-off. This interesting feature is particularly suitable for lipstick. To prove the interesting sensorial profile of tested item vs silicones, the ingredient has been included in a body butter formula as substitute of exact % of silicones (1:1). An internal panel test was carried out involving 20 volunteers to evaluate the formula in terms of spreadability, evanescence, smoothness, silky & slippery touch (Figure 2). Tested item applied in skin care formula shows a comparable performance with ones of benchmarks. Better results have been reached formulating *Ethylhexyl Pelargonate* in a highlighter formula, where all the panelists described the ingredient similar to silicones in terms of spreadability and evanescent touch.

Beside the excellent performances in use, *BeauSens® Air* demonstrates a positive impact on Environment thanks to a tested biodegradability behavior.

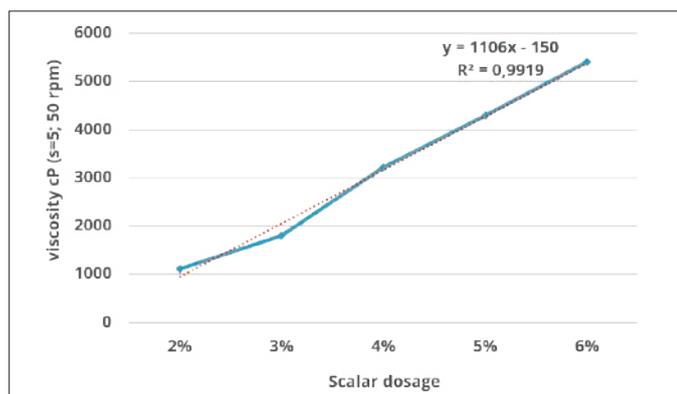


Figure 3 – Emulsifying properties

Oil-in-Water Emulsifier

BeauSens® E-SF (INCI: Polyglyceryl-3-Stearate, Sunflower Seed Oil Glycerides, Cetearyl Alcohol) is a primary emulsifier designed with excellent performance in formulating stable O/W emulsions with a pleasant touch. Its own easy-to-handle pearl form improves dosing precision. Excellent skin biocompatibility and pleasant skin feel with fresh and hydrated after feel. Starting from 5% of use, it reveals emulsifying properties and viscosity demonstrates a linear correlation with the dosage %. (Figure 3)

Mild Surfactant for Skin Support

Surfactants are perhaps the most important of all ingredients, with so many useful applications that the cosmetic industry probably would not exist without them. They are used for cleansing, foaming, thickening, emulsifying, solubilizing, penetration enhancement, antimicrobial effects, and other special effects. Special attention towards mild cleansing has been put into place by ROELMI HPC's intention to preserve skin natural ecosystem by dermocompatible compounds.

In line with growing market concepts, *BeauSens® PG4* (INCI: Polyglyceryl-4 Pelargonate) perfectly answers to “water saving”, “zero waste” and “clean beauty” conscious approaches.

In fact, *BeauSens® PG4* is a non-ionic mild surfactant with solubilizing properties. Unlike standard non-ionic surfactants, it is a concrete sustainable solution for various cosmetic formulas, especially for cleanser applications in which good foam control is required. Its low water content and its upcycled origin bring a benefit for sustainable cosmetics.

To evaluate the foaming activity of the test item a foaming power test was conducted following the Ross-Miles method on *BeauSens® PG4*, Sodium Laureth-2 Sulfate, Polisorbate-20, Polyglyceryl-4 Caprate. In comparison with benchmarks, the ingredient does not show a high foaming power, both for the height of the foam and the type of bubbles obtained, smaller and more compact near the edge of the solution (Figure 4).

A great mild surfactant with at the same time remarkable solu-

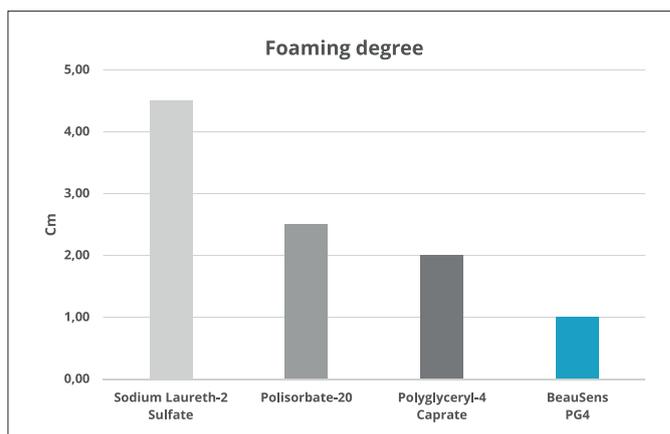


Figure 4 – Foaming control

bilizing properties, tested with essential oils, synthetic and natural perfumes and fat-soluble active ingredients, for making cosmetics formulas in the light of sustainability.

Safety tests have been performed according to the legislation in force. *In vitro* evaluation of skin irritation by means of Zein Test reported non irritant results. The *In vitro* Het Cam Test for the eye irritating potential cytotoxic potential also noted no irritation potential. The ingredient was also evaluated as non comedogenic and as non irritant & non sensitizing by means of the *In-vivo* skin sensitization: H.I.R.P.T.

Conclusions

The main objective of this current industrial study was to analyze a series of ethical ingredients targeting the future of Beauty, more and more aligned with the growing interest in conscientious formulas able to demonstrate a minor impact on the Planet. The sustainable profile of finished formulas is strictly linked to the selection of the inner compounds completing the cosmetic recipe in which the “eco-friendly” feature is of paramount importance and should be driven by innovation and inspired by a more equitable, inclusive and sustainable model of production.

As previously investigated, conscious beauty approach is not only based on understanding skin types, but also on consumers care in evaluating the wider ethical and environmental impact of a purchase with the same gravity as personal priorities, with credentials such as safety, transparency and ethical sourcing often being prioritized.

Following sustainability goals and commitments, pushing towards a circular model, it is possible to satisfy the urgent need by consumers. A concrete example? The line described above and composed by three different ingredients suitable for specific cosmetic applications: an emollient with an extremely evanescent touch, an emulsifier for water in oil emulsions and a mild surfactant for gentle cleansing.

References and Notes

- 1 *Cosmetics Europe “Ten steps to sustainability”, 2012*
- 2 *From sustainability to purpose in beauty, Euromonitor Passport 2021*