



# NATURAL INGREDIENTS: FOOD, PERFUME, AND COSMETICS

Since the earliest stages of human history, natural products have played a central role in our lives – used for nourishment, medicine, personal care, and beyond. They offer a very large panel of great solutions and naturality is often perceived as healthier and better for the planet, rooted in the idea of using what nature provides. But what is a natural product?

— According to the Oxford English Dictionary

*The word natural refers to something “existing in or derived from nature; not made or caused by humankind.” This broad definition shows a common understanding of natural as being pure, untouched, and inherently good.*

In an era where sustainability and health-conscious choices drive consumer demand, the concept of «naturality» has become a key differentiator in multiple industries, from food and flavors to perfumes and cosmetics.

But it's more complicated than that. Natural products are indeed fully aligned with sustainable concepts but depending on how these ingredients

are sourced and produced, some could come with significant sustainability trade-offs, including excessive land use, biodiversity loss, and high carbon footprints from global sourcing and extraction.

This article explores the complexities of naturality across flavors, perfume, and cosmetics, comparing regulations, industries and end-consumers perspectives.



# Regulatory

**What qualifies as «natural» varies significantly depending on the industry and region.**

## REGULATORY LANDSCAPE FLAVORS

The naturalness of flavors is a crucial aspect of the global food industry. It addresses **consumer-centric demands, such as wanting healthy, transparent, and sustainable products free from artificial substances**. While naturalness is regulated globally, there is no common definition of «natural» for flavors in different regions of the world.

In Europe, the flavor [regulation \(EU\) 1334/2008](#) defines the complex rules that apply to qualify a flavor as «natural.» Strict conditions are outlined for using the term «natural» to describe a flavor, including requirements regarding the source material, the manufacturing processes allowed (only enzymatic, physical, microbiological, and traditional methods are permitted), and the natural occurrence of the flavoring substance in nature.

In the U.S., the regulatory framework differs from that of Europe. The [CFR 21 §101.22](#) provides a distinction

between natural and artificial flavors. The focus is more on the origin of the raw materials used rather than the processes applied. Additionally, the rules for labeling natural flavors vary between Europe and the USA.

**Beyond the definition of naturalness, biobased content is also a key concept for substances used in flavors**, but also in fragrances. A biobased ingredient is extracted or manufactured from raw materials of biological origin, typically plants, microorganisms, or other renewable resources derived from biomass.

**The assessment of the biobased content for an ingredient can be realized using norms validated at European scale.** The norm [CEN/TS 16640:2017](#) is the standard reference to assess and proof the biobased content for an ingredient through the determination of the radiocarbon content in the product.

## REGULATORY LANDSCAPE PERFUME & COSMETICS

Both in Europe and the USA, there is no clear legal definition of naturalness for cosmetic ingredients and fragrances.

In Europe, the cosmetic **regulation ([regulation \(EC\) 1223/2009](#)) on cosmetic products does not provide a specific definition of naturalness**, it sets strict requirements regarding ingredient safety and allows manufacturers to use external certifications to claim that their products are natural or organic.

In the US, according to [CFR 21](#), fragrances and flavors can be of natural or synthetic origin. Manufacturers can use natural fragrances, but the CFR does not provide clear criteria to

define what constitutes a natural fragrance.

In this context, norms and certifications have been developed to define manufacturing conditions and source materials, allowing consumers to better understand the authenticity criteria of a product.

**Two norms have been developed by leading associations and certifications bodies** to assess cosmetic ingredients on their ability to be qualified as natural or organic: the [Cosmos standard](#) and [ISO 16128 standard](#). Cosmetic ingredients and substances for fragrances audited under these schemes are granted to be natural under specific rules clearly defined.



## Consumer expectations & market trends:

### Natural molecules are always better perceived than their synthetic counterparts

Even though synthetic «nature-identical» molecules are chemically equivalent to their natural counterparts and can offer consistency and sustainability benefits, some consumers remain skeptical. The perception that natural ingredients are fundamentally safer or more effective leads to hesitation in accepting synthetic alternatives.

Take food and flavors for example. As we have discussed in previous articles, **the demand for clean label and transparency is increasing among end-consumers**. We are more aware of what we eat, and many say they want to move away from additives and synthetic ingredients, turning to natural food and ingredients believing it's healthier. Many say the fewer the ingredients, the better it is. And indeed, many ultra-processed foods can have high levels of potentially dangerous ingredients like saturated fat, salt and sugar. There is also a risk that natural nutrients are lost during the processing.

**While natural ingredients can offer nutritional benefits, studies indicate that «natural» does not always mean «healthier».** For example, a 2021 study by the International Food Information Council (IFIC<sup>1</sup>) found that consumers perceive natural foods as healthier. In the same study, IFIC warns consumers to only rely on claims and marketing strategies from producers regarding natural food – because while natural food contains a variety of nutrition, consumers should look at the whole nutritional profile and ensure a diversified diet. In parallel, research published in Trends in Food

Science & Technology highlights that some natural compounds can have anti-nutritional effects or contain harmful substances, emphasizing the complexity of natural compounds in food.

In the personal care industry, naturality is becoming more predominant. Consumers are increasingly **seeking fragrances that align with their environmental and ethical values, leading to a demand for plant-based and eco-certified perfumes**. The «clean beauty» movement promotes products formulated without harmful chemicals, focusing on natural, organic, and sustainably sourced ingredients. According to a study published in cosmetics business, 68% of consumers<sup>2</sup> now actively seek skincare products made with clean ingredients.

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But it's not all that simple in this sector either. For example, while essential oils are widely valued for their natural origins and aromatic properties, their use is not without risks. They can contain substances with potential allergic reactions or inhalation toxicity. Their health effects require careful regulation and informed usage.

#### Note

<sup>1</sup>IFIC-2021-Food-and-Health-Survey.May-2021-1.pdf

<sup>2</sup><https://cosmeticsbusiness.com/68-of-consumers-seek-clean-beauty-information-and>





## Industry challenges & manufacturer perspective:

For manufacturers, the growing consumer demand for “natural” products is both an opportunity and a complex challenge.

As expectations around clean labels, synthetic free, transparency, and naturality rise, brands are responding by **developing natural and safe products that appeal to conscious consumers**. The large demand of consumers is positively pushing industrials to improve their production processes and move away from fossil resources. To achieve this, they are under increasing pressure to reformulate products without compromising on taste, odor, safety, shelf life, or affordability.

### INDUSTRIAL FEASIBILITY – REFORMULATION, STABILITY AND CONSISTENCY

One of the primary challenges manufacturers faces is the **reformulation of existing products** to comply with natural labeling claims, without compromising the quality and performance of the product. Removing synthetic additives and preservatives often means revisiting well-established formulations – ones that have been optimized over years

for performance, cost-effectiveness, and regulatory compliance. Many synthetic ingredients, such as artificial flavors, acidity regulators, preservatives or sweeteners, offer a level of **consistency, stability, and intensity** that can be complex for manufacturers to match with natural alternatives.



### ENVIRONMENTAL PRESSURE

Another pressing issue for manufacturers is how to balance sustainability goals with performance and cost-efficiency. Sourcing natural ingredients can be costly and subject to market and seasonal volatility, and supply chain constraints. On top of that, **natural raw materials can be environmentally intensive**, requiring vast amounts of water, land, and energy for cultivation, extraction, and transportation. Examples include rose or sandalwood essential oils, which demand significant plant biomass and

processing, often sourced from remote regions with fragile ecosystems.

Ultimately, while consumers often associate «natural» with simplicity and purity, manufacturers must contend with the **technical and logistical complexity** of delivering such products on a scale. Balancing naturality with product performance, shelf life, safety, and cost remain a delicate act.

## The sustainability paradox: Is natural always better?

Sustainable benefits is another argument for many end-users to consume natural ingredients and products. Usually these products have sustainable advantages, but not always. **As for any other product, the environmental footprint of natural products and ingredients depends on several factors**, including agricultural practices, land use, water consumption, extraction methods, and transportation.

For example, exotic natural ingredients such as coconut or acai berries often require long-distance transportation, which can lead to significant carbon emissions. Similarly, the large-scale farming of certain natural crops, like almonds or avocados, places a heavy strain on water resources, especially in drought-prone regions.



Another overlooked aspect is the impact of ingredient extraction. For example, natural colorants like carmine<sup>3</sup>, derived from cochineal insects, require large-scale insect farming and intensive processing. It takes about 155, 000 insects to make one kilogram of cochineal.

**Ultimately, the sustainability of a product depends on the entire lifecycle of its production—from sourcing to processing to transportation.** That is why we can sometimes see some synthetic or fermentation-based alternatives with a lower environmental impact.

## Fermentation: The natural alternative?

This is where **fermentation-derived, biobased ingredients** offer a compelling solution to many of these challenges – meeting customer demand, industrial challenges like scalability and safety and sustainability without depleting fossil resources.

Microbial fermentation – a controlled, biotechnology – allows manufacturers to produce natural ingredients such as **organic acids (e.g., lactic acid, acetic acid, citric acid)** from renewable raw materials like sugar or agricultural by-products.

Because fermentation uses naturally occurring microorganisms and can use non-GMO biomass feedstocks, the resulting ingredients can often qualify as “natural” under both U.S. and EU definitions—while maintaining the **high purity,**

**consistency, and safety** required for industrial use. In addition, fermentation processes are **scalable and environmentally efficient**, often requiring fewer resources and producing lower CO<sub>2</sub> emissions compared to traditional extraction.

By using optimized fermentation, manufacturers can produce nature-identical aroma compounds without the need for petrochemicals or overharvesting of endangered species. In the cosmetics sector, fermentation is also emerging as a **source of high-performance natural alternatives** to controversial synthetic ingredients. Biotechnologically derived **preservatives, emulsifiers, and silicones** are now being used to replace synthetic versions without compromising on texture or product protection.

## Key takeaways

Natural and naturality are complex terms, without a global regulatory framework and can often be misinterpreted. Manufacturers and producers face many challenges complying with both regulatory requirements, customer demand, profitability and sustainability.

Fermentation-based innovation offers a bridge between **consumer expectations and industrial feasibility** – enabling manufacturers to meet “natural” demands without sacrificing functionality or sustainability. As biotechnology continues to evolve, it’s clear that **fermentation will play a central role in the future of sustainable food, flavors, cosmetics and fragrances** – helping brands not only meet consumer expectations but lead responsible innovation.

### Note

<sup>3</sup><https://blog.entomologist.net/to-manufacture-cochineal-dye-how-many-insects-are-needed.html>

