

WHITE PAPER 2020



How to **add vanilla notes** to your
product while reducing the amount of fat
and sugar



Ennolys
by Lesaffre

WHAT IS A FLAVORING?

History of flavorings

Flavorings have been in use since Antiquity! The Egyptians and Romans were the first to use aromatic plants such as herbs and spices.

The field of science progressed during the Middle Ages, in particular with the development of new extraction techniques such as that of distillation, bringing about the discovery of new flavorings¹. In the 19th century, developments in chemistry saw the emergence of the first synthetic flavorings. Thus, in 1874, vanillin was discovered². Scientific knowledge continued to develop, and in the 20th century, the Maillard reaction was discovered³ (a chemical reaction that occurs when cooking food containing amino acids and sugar). This was followed by the discovery of flavorings described as grilled, roasted, or oven baked. But research did not stop there of course! Each year, many new flavorings appear, thus completing a very extensive range.



Flavorings have been used since antiquity!

Definition

Flavorings are framed in the European Union by the 1334/2008 Regulation entered into force on January 20, 2009. A flavoring is officially defined as "a product not intended to be consumed as is, but which is added to foodstuffs to give them odor and/or taste or to modify these qualities⁴".

Flavorings can be natural or synthetic. Ennolys aromas are natural flavoring substances obtained by fermentation. The term "natural substance" is understood to mean "a flavoring substance obtained by appropriate physical, enzymatic or microbiological processes, from vegetable, animal or microbiological origin material used as is or processed for human consumption by one or more of the traditional food preparation processes". Natural flavoring substances correspond to substances that are naturally present and identified in nature⁵.

CONSUMER EXPECTATIONS

Ever more demanding consumers

Local, organic, GMO-free and pesticide-free products... Consumers are becoming picky about their choice of foods. Being wary of food manufacturers, consumers ask for more transparency and naturalness in labeling... They demand lists of ingredients reduced to the bare minimum as well as an absence of artificial ingredients. 70% of consumers agree that a product with the fewest possible ingredients is more attractive! The French tend to dislike GMOs and therefore avoid them: 65% of them even think that GMOs represent a risk for human health.

Armed with their smartphones, they search for additives and green labels from Nutri-Score. Better informed, more and more people are trying to understand labels. 7 out of 10 French people read them, and in particular the information relating to sugar content (63%), the presence of additives (66%), the fat content (56%) and the presence of preservatives (55%)⁵. This change in consumer behavior has led to the development of numerous applications for making food choices, such as Yuka or Kwalito.

This is not just a passing trend; clean label reflects a real shift in our relationship with food. It presents a real challenge for manufacturers to stay in the race and meet firm, or 'prerequisite', consumer demand.

Looking for naturality

"100% natural" products have invaded our shelves, to respond to consumer demand for authenticity.

83% of French people say that when buying a product they give importance to the naturality of products they buy. Although there is actually no regulatory frame, naturality is synonymous with the absence of artificial ingredients.

Many consumers want to act in a positive way for the environment. For example, through fair trade or the choice of organic farming products. This market has also experienced spectacular growth: 46% of French people buy organic products and 6 out of 10 buy local products⁶.

Products resulting from fermentation are more and more popular and have a positive reputation for 66% of French people. And an astonishing 40% of them are aware of flavorings produced through fermentation⁶.

This 100% natural trend, first seen in the agrifood sector, has now largely spread to the nutraceutical and cosmetic sectors. Several factors may explain this change in consumer habits. The first is undoubtedly related to health. For the last several years, daily prevention campaigns have been raising awareness on the link between diet and health. Consumers will thus avoid ingredients which they consider harmful. Meaning, 32% of consumers associate a "natural product" with a "healthy product".

To help them meet consumer demand for naturality, Ennolys provides manufacturers with a wide range of natural flavorings produced through fermentation.

NATURAL VANILLIN, AN INGREDIENT RESULTING FROM FERMENTATION



Vanilla, a fluctuating market

Vanilla is one of the most popular flavors in the world. Pastry, dairy products, confections... It's used by a plethora of food matrices.

A favorite spice in France, it is also one of the most expensive, just after saffron. Since its production depends on the climatic and social conditions of the producing countries, the vanilla market fluctuates enormously. In 2017, 80% of the world's production came from Madagascar. But in recent years, their production has been considerably impacted by different factors such as successive storms, periods of drought, but also the steep growth in supply and demand, which has affected the quality of pod maturity. Madagascan producers have now understood that they can influence pod prices according to supply and demand. Numerous partnerships have been developed with a few companies in the flavorings world in order to better control the quality of the pods and their price.

The vanilla pod contains around 2% of vanillin, which gives it its particular taste.

In order to offer a natural and sustainable alternative, Ennolys offers a vanillin from fermentation (Ennallin). This manufacturing process allows us to produce throughout the year and to provide our customers with a stable product over time.

Fermentation, an ancient process

Fermentation is a natural process that can be defined as a "transformation that certain organic matter undergoes under the action of micro-organisms". This is an ancient process used primarily to sanitize foods and increase their shelf life. Still widely used in Asia and becoming popular again in western countries, fermentation also increases the digestibility of food products and produces molecules of interest, such as flavorings. Several micro-organisms are likely to carry out fermentations: bacteria, yeasts and molds. Each micro-organism has its own fermentation properties. Thus, it is essential to select the microorganism suited to the source ingredient (substrate) and to the expected result or benefit in order to obtain the desired aromatic molecule.

There are several types of fermentation, the most well known being:

- Lactic fermentation. Carbohydrates are converted into lactic acid under the action of lactic acid bacteria. This kind of fermentation is for example used in the production of yoghurts, cold meats or sauerkraut.
- Ethanolic fermentation. Fermentable sugars are converted into ethanol with release of CO₂ in the presence of yeasts. This fermentation is used for the manufacture of alcoholic beverages and during the bread-making process.
- Acetogenic fermentation. The ethanol in wine is converted into acetic acid with the help of acetic bacteria. This is how vinegar is produced.

Fermentation has been widely developed and is today the source of many popular products such as food ingredients (flavors, thickeners and preservatives), enzymes (food processing aids, detergents), active ingredients of medicine (insulin, antibiotics, hormones), cosmetics (hyaluronic acid).

Process for obtaining vanillin by fermentation

Vanillin is a natural flavoring substance. Several steps are necessary to obtain it and to ensure its quality.

The first step is to carefully select the raw material and the appropriate microorganism. In the case of vanillin, the raw material is ferulic acid, an agricultural by-product extracted from rice bran. Sourcing is therefore based on natural and sustainable components.

The first step in fermentation consists of cultivating the microorganism in a bioreactor, in a controlled environment, in order to ensure optimal growth conditions. This is the propagation phase. Then, ferulic acid is introduced and bioconversion of ferulic acid into vanillin occurs under the action of the micro-organism. We obtain a fermentation must rich in vanillin which will then go through phases of separation, extraction, purification by distillation, then crystallization. The flavoring substance thus isolated and purified can be packaged.

Quality inspections take place throughout the production chain to ensure a top quality product. In addition to traditional physicochemical and microbiological inspections, Ennolys submits its production to expert organoleptic quality inspection panels.



Selection of the natural source ingredient and microorganisms



Natural fermentation



Separation



Extraction and purification



Crystallization



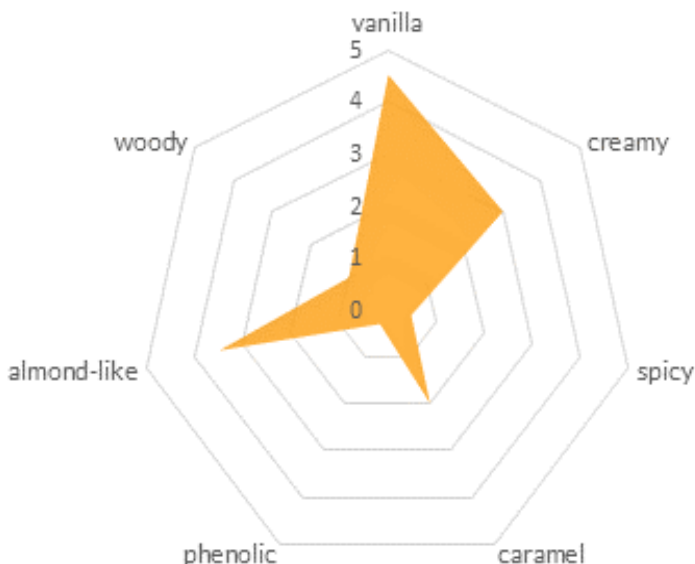
Packaging



Quality inspection

Sensory profile Ennallin

Vanillin in the food industry



Ennallin presents a dominant vanilla note, accompanied by milky and almond notes evoking a soft and sweet aspect. It integrates with many food matrices: dairy products, chocolates, biscuits and brioches, drinks including alcoholic beverages, specialized products (sports, slimming, etc.), fruit preparations, etc... to bring roundness and length in the mouth.

The benefits of vanillin are multiple:

- Decrease acidity
- Dilute the bitterness of certain food components
- Hide off-notes



Used in sweet preparations, this natural flavoring substance can be used to reduce the quantity of sugars. It also helps to boost the chocolate and fruity notes.

You will by now have spotted that it offers numerous possibilities thanks to its organoleptic properties.

ENNOLYS, EXPERT IN PRODUCTION OF NATURAL AROMATIC MOLECULES FROM FERMENTATION

Natural molecules resulting from fermentation are the Made in France choice solutions to support manufacturers in their product formulation. They are intended for flavorists and the food, nutraceutical, cosmetics and perfume markets.

To meet the needs of manufacturers, Ennolys has created the Ennarom range, aromatic molecules made from natural raw materials. Ennolys has also developed Ennallin, a natural vanillin obtained by fermentation, as well as Ennallin Solutions & Mixes, aromatic and functional blends.



NATURAL AROMA MOLECULES

Thanks to its experience in biotechnology, Ennolys offers a wide range of natural aromatic molecules. All derived from natural raw materials using natural processes: bioconversion and biosynthesis. These natural molecules can be integrated into many aromatic compositions and have unique olfactory and taste characteristics.



Ennolys has a team dedicated to the development of vanillin, the flagship molecule of the Ennallin range. This natural flavoring substance is obtained by a natural fermentation process. Ennallin meets the requirements for natural flavoring substances of European regulations (CE 1334/2008) and US (natural US according to FDA guidelines 101.22 (3)). Thanks to numerous physicochemical and sensory inspections, Ennolys guarantees a high quality molecule. Durable, competitive and high-quality, Ennallin offers an alternative choice for manufacturers wishing to develop products that meet consumer expectations in terms of naturality and sustainability.



In order to support manufacturers in their product formulation, Ennolys has developed Ennallin Solutions & Mixes from its vanillin.

- Mix Ennallin brings a vanilla note and increases the sweet sensation of a product, and therefore decreasing its sugar content.
- Mix Ennallin Butter brings sweetness to biscuits and reduces the fat content by 30% in brioches. This mix can also be used in dairy products to add a vanilla note. It also intensifies the fruit notes and brings caramelized and creamy chocolate notes as well as a perception of sweetness.
- Mix Creamy provides smoothness without adding fat.
- Mix Coco brings an intense taste of coconut, a length in the mouth while boosting the sweet and buttery perceptions.

Tailor-made experience, what are you looking for?

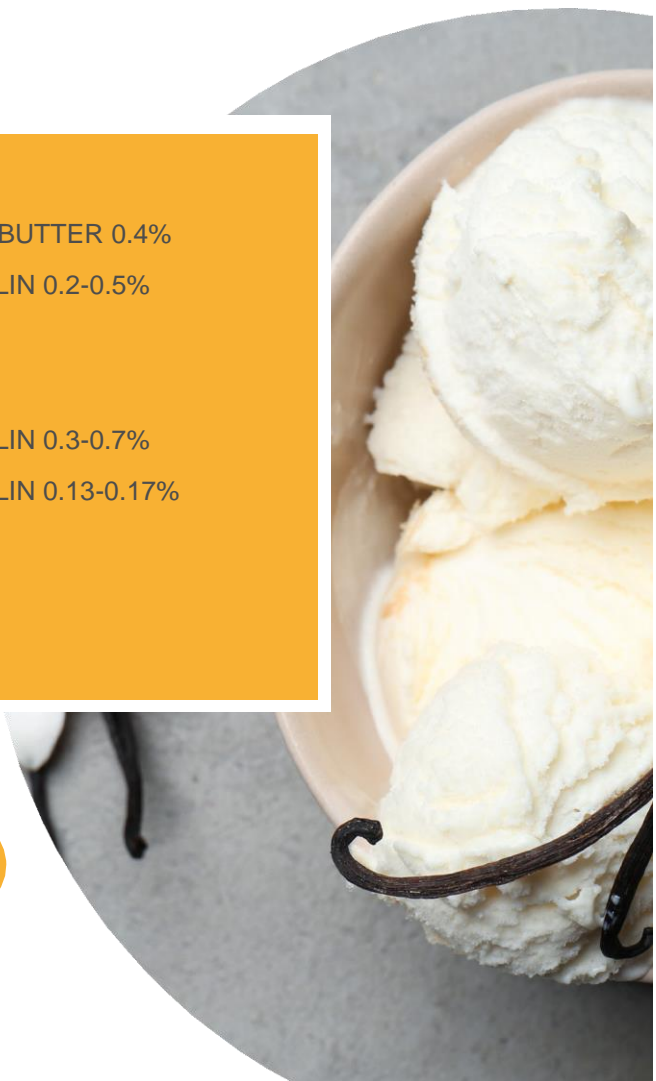
	Mix Ennallin	Mix Ennallin Butter	Mix creamy	Mix Coco
Gourmet vanilla note	🌸	🌸		
Buttery / milky note Caramel note		🌸	🌸	
Coconut note				🌸
Sugar reduction	🌸	🌸		🌸
Fat reduction		🌸	🌸	🌸
Masking off-notes	🌸	🌸	🌸	🌸

Ennolys has a dedicated sensorial analysis panel trained in the Ennallin Solutions & Mixes range in order to guarantee the product's quality and stability. Ennolys also offers tailor-made support to guide its clients in the formulation of their products.

Example of Ennallin Solutions & Mixes dosage table:

Protein Drink	MIX ENNALLIN 0.2-0.5%
Brioche	MIX ENNALLIN 0.7% / ENNALLIN BUTTER 0.4%
Dark chocolate	MIX ENNALLIN BUTTER / ENNALLIN 0.2-0.5%
Cookie	MIX ENNALLIN 0.8-1.2%
Fruit Preparation	MIX ENNALLIN 0.2-0.5%
Ice Cream	MIX ENNALLIN BUTTER / ENNALLIN 0.3-0.7%
Yogurt	MIX ENNALLIN BUTTER / ENNALLIN 0.13-0.17%
Biscuit	MIX ENNALLIN BUTTER 0.5-1%
Croissant	MIX ENNALLIN 0.35%
Panettone	MIX ENNALLIN 0.8%

The doses vary depending on the issue.



ENNOLYS, NATURALITY AND QUALITY AS A SIGNATURE

Obtaining natural flavorings is a long process, requiring perfect mastery of the bioconversion and biosynthesis processes. Ennolys, rich in its experience in fermentation and biotechnology, offers a wide range of natural flavorings from fermentation. It places naturality and quality at the center of its priorities. For more information, contact us!



MADE IN
FRANCE



VEGAN



HALAL



KOSHER
(upon
request)



Ennolys
by **Lesaffre**



FERMENTATION
MADE IN FRANCE
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1. SNIAA - National Union of Aromatic Food Ingredients
2. France Chemical Company, Vanilla and Vanillin
3. Bertrand E, El Boustany P, Faulds C, Berdagué J, "The Maillard Reaction in Food: An Introduction", 2018
4. REGULATION (EC) No 1334/2008, article 3§2.a.1, OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 December 2008 relating to flavorings.
5. REGULATION (EC) No 1334/2008, article 3§2.a.1, OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 December 2008 relating to flavorings.
6. Field survey carried out by YouGov on 1031 French people in November 2018.
7. Larousse