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# STILL USING SYNTHETIC PRESERVATIVES?

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INNOVATION AND URGENCY  
IN NATURAL ALTERNATIVES

## STILL USING SYNTHETIC PRESERVATIVES? CONSUMER DEMAND AND REGULATORY ISSUES DRIVE INNOVATION AND URGENCY IN NATURAL ALTERNATIVES

**KEYWORDS:** Natural, natural preservation, shelf life, edtareplacement, clean label, botanical preservatives, natural antimicrobial, reducefoodwaste, natural preservatives.

### ABSTRACT

Consumers today are increasingly seeking clean label, natural ingredients. This article examines how the shift away from synthetic ingredients is driving innovation throughout the food and beverage industry towards natural, plant-based alternatives and solutions for preservation and shelf life. Natural preservatives are in high demand as regulatory requirements are increasingly banning or discouraging the use of many synthetic ingredients commonly used, such as EDTA. Advancements in R&D have led to the discovery of a variety of botanical ingredients that demonstrate excellent performance as natural preservatives. Many of these have been shown to preserve nutritional and sensory loss prevention just as effectively as synthetics making them ideal for clean label applications while effectively extending shelf life, reducing food waste and financial loss, and preserving food safety and integrity.

#### CONSUMER DEMAND FOR NATURAL, CLEAN LABEL & FREE-FROM

In the last few years there has been an irreversible shift and transition from the use of synthetic ingredients and additives toward natural ingredients and botanical extracts with technological functions. This transition has been primarily driven by ever-increasing consumer demand for natural, clean label, free from, and short lists of ingredients consumers can pronounce and perceive as healthy.

We are living in an era where labels and ingredients are carefully scrutinised and concern regarding the use of synthetic preservatives and additives is top of mind for a growing constituency of consumers. 73% of consumers are more likely to buy products containing ingredients they recognise and trust (1), and 46% of consumers associate clean label with "good for you" (2).

Many innovations and studies to address these new trends and challenges are coming from the world of botanicals. A number of botanical extracts - including rosemary, oregano and green tea - have been extensively researched and shown to be effective natural preservatives, with excellent potential for shelf life extension. (3, 4).

In particular, botanicals that are high in potent antioxidants are leading the

way as equitable alternatives, providing plant-based, natural preservation solutions that comply with clean label demands.

#### REGULATORY UPDATE ON PRESERVATIVES

The regulatory climate regarding botanicals is also evolving, yet needing further clarifications. In addition to having a bad reputation, preservatives, especially synthetic ones, are severely limited – mainly due to negative or not fully understood effects on human health. The various legislations (eg. 21 CFR part 172 for the US and Reg. 1333/2008 for EU) therefore clearly specify dosage limits and the products in which use is permitted. The regulations contain a positive list broken down by product, therefore only the preservatives present on this list can be used in the respective product categories, and in each case, the dosage is always very low, reduced to the minimum possible to perform its technological function.

Consumer voices have also influenced regulatory decisions, with the EU and other countries banning or limiting the use of certain preservatives and additive ingredients, and modifying label and claims requirements. Regulatory requirements and consumer demand have fueled innovation throughout the food industry, and manufacturers are under mounting pressure to find

effective, natural solutions to preserve product safety, flavour, colour, nutrition, and integrity, delay spoilage, and also reduce food waste.

#### FOOD WASTE PREVENTION: ECONOMIC, SOCIAL, & ENVIRONMENTAL RESPONSIBILITY

In the latest FAO report (5), it is estimated that around 931 million tons of food waste was generated in 2019, 61% of which came from households, 26% from food service and 13% from retail. The resulting economic damage throughout the entire food supply chain is enormous - and avoiding food waste is also a key social responsibility given concerns about global food insecurity.

The important objective of reducing food waste can be achieved, not only through consumer education, but also through efficient distribution practises and products formulated with effective ingredients for preservation.

Thankfully, nature offers many new solutions for effective food preservation – which are also environmentally responsible - helping to conserve water, land, and energy, in addition to also reducing carbon dioxide / greenhouse gas emissions.

#### NUTRITIONAL AND SENSORY LOSS PREVENTION

Extension of shelf life does not



just involve economic, social and environmental considerations, but also has sensory and nutritive implications. For example, if we consider lipid oxidation - one of the main degradations of food - we can measure clearly how oxidation and resulting food decay affects sensory profile and nutritional value of food. There are a number of factors that influence food oxidation including, the fat content of food products, exposure to light, heat and metals, as well as simply the passage of time. This naturally occurring phenomenon, called oxidative rancidity, involves the formation of peroxide and hydroperoxides (not beneficial for the human body) as well as the degradation of fats to aldehydes to ketones -

responsible for the characteristic odour of rancidity. It follows that the use of natural preservatives would allow for both preserving the nutritional value and sensory aspects of foods.

#### **BOTANICALS FOR NATURAL SHELF LIFE EXTENSION**

Product reformulation is an important, key strategy in the battle to reduce food waste and meet growing consumer trends for natural preservation. As manufacturers work to replace synthetic preservatives such as EDTA, TBHQ and others, whose impacts on the environment are significant and complex, the inclusion of select, scientifically-supported plant extracts can help

extend shelf life naturally, while also being obtained from renewable, sustainable botanical resources that are better for the planet.

Two well-supported botanicals for preservation include rosemary and green tea, and innovation in the area of natural preservation has led to the discovery of additional botanicals that in certain matrices outperform even these natural sources. The newer antioxidant, polyphenol-rich botanicals that meet consumer needs for natural and clean label ingredients can now provide preservation and shelf-life benefits for a broad array of products - including meats, snacks, bakery, dressings, sauces,

condiments, fats, oils, pet foods, cosmetic and personal care products, and more.

Today's innovation centered around the use of botanicals for effective preservation must carefully consider a number of factors:

- Sensory Profile/Taste/Aroma
- Color/Appearance
- Shelf Life
- Food Safety

While botanicals such as rosemary, green tea, and oregano are often used for natural preservation, they can also have a strong impact on the sensory profile of the final product. Ongoing botanical research continues to drive further innovation in the discovery of other natural plant-based sources and botanical combinations with a more neutral taste profile.

#### NATURAL EDTA ALTERNATIVES

The chelating agent EDTA is an additive widely used worldwide in household and industrial applications, and is one of the anthropogenic compounds with highest concentrations in inland European waters. EDTA is used by the food industry, especially in condiments and mayonnaise, due to its particular conformation, which is very effective in complexing metals (chelating), especially bivalents, catalysts of various oxidative reactions. The replacement of EDTA is one of the main challenges for the cosmetic and food industries, however, as its use is arousing much concern among consumers regarding safety and due to its low biodegradability. It is not surprising that legislation is underway to

completely restrict its use. The plant world is rich in natural chelating substances. Just imagine the efficacy of the catechins in tea or the punicalagins of the pomegranate. The extracts obtained from the respective botanical species, if properly made, can simulate the chelating effect of EDTA.

Suppliers and manufacturers continue to innovate, exploring a variety of botanicals, natural plant-derived compounds and combinations thereof. It is reasonable to expect that in a short time it may be entirely possible to completely replace EDTA with natural alternatives across the full range of key applications.

#### LOOKING AHEAD: CONTINUED BOTANICAL INNOVATION, INCLUDING ANTI-MICROBIALS

The microorganisms involved in food deterioration are many and various including, *Penicillium spp* and *Zygosaccharomyces bailii*. However, the most dangerous class for human health are pathogenic bacteria such as *Salmonella spp* and *Listeria monocytogenes*.

It is difficult, if not impossible, to find a broad-spectrum bactericidal substance that is not harmful to human health.

But the plant kingdom can be of inspiration, as it is rich in antimicrobial substances, which if properly purified can contribute to the preservation and shelf life of food and beverage products.

Spoilt food occurs at every stage of supply chain. Today, despite the growing demand for "zero km" products, globalisation has created a global supply chain. It is the manufacturer's responsibility to preserve product integrity

and safety throughout the distribution phase and to have contingency plans in place for unforeseen events, such as manufacturing or shipping delays, or a rise in temperature.

#### CONCLUSION

Natural preservatives can play a fundamental role in guaranteeing greater protection, especially from microbial proliferation during the transport and distribution processes. Effective food preservation contributes direct value to the consumer experience.

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## ABOUT THE AUTHOR

**Luca Pennestri** is General Manager of Layn Natural Ingredients EMEA Region. Pennestri earned his degree in economics from the University of Leeds. Pennestri has a strong background in supply chain practices, agriculture and sustainability, extraction processes and identifying targeted applications for natural, plant-based ingredients.

