Fermenting a label-friendly future with citric acid

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Flavorant, preservative, chelant and more: Citric acid is one of the unsung heroes of the food, beverage, personal care and pharmaceutical worlds.

"It's been used in food production since the 1800s; but in the acidulant world, citric acid still represents the gold standard, combining consumer appeal with a host of functional benefits," says Cargill's John Bohlmann, who has spent most of the last three decades working with the multi-functional compound. "This value-added ingredient is no commodity – there's a lot of acid power in this tiny 6-carbon molecule."

As its name implies, the versatile acid is found in lemons, oranges and other citrus fruits, where it provides the vibrant tartness consumers love. But that's not the origin of today's citric acid supply; in the 1920s, the food industry discovered certain strains of the fungus Aspergillus niger produce high levels of citric acid, too. Soon this fermentation process became the industry standard, establishing itself as the most cost-effective, efficient approach to the production of citric acid.

Label appeal

Today, citric acid is among the most commonly used ingredients in both food and non-food industries, found in everything from energy drinks to whole-wheat bread and ice creams to pharmaceuticals. In part, this popularity is thanks to the variety of functions it performs, but credit should also be given to its undeniable status as a label-friendly ingredient.

Cargill's IngredienTracker™ consumer research consistently finds that citric acid is one of the few acidulants with a positive net purchase impact. Conducted annually across a wide swath of consumers, the company's most recent survey revealed only rosemary extract scored higher. For Elmar Guseyn-Zade, Cargill's acidulants product line manager, it's this distinction as a consumer-preferred ingredient that sets citric acid apart from alternate ingredients.

"Acidulants serve important roles, but consumers are leery of some of these ingredients, uncomfortable with their chemical-sounding names," he explains. "Then they see citric acid on the label, and those negatives fall away."

It's a fair assessment, given citric acid occurs naturally in organisms. It can be found in all types of living creatures, including humans, which make 1 to 2 pounds of citric acid in their bodies every day.

"Unlike most alternatives, citric acid is very much a part of our daily life," Bohlmann says, "and those credentials are pretty hard to beat."

Fittingly, citric acid may be used in products labeled as "organic" or "made with organic ingredients." And for consumer goods manufacturers looking for a more sustainable option, the fermentation-derived ingredient may help, with added appeal as a safe and biodegradable choice.

Functional rewards

Inside the human body, citric acid is a key component for metabolism into usable chemical energy. It also serves as a raw material for the formation of other key substances needed to sustain life. Citric acid is equally important to the industrial world, where it can be used to treat water, remove lime-scale buildup and more.

In the food and beverage space, citric acid is perhaps best known for its contributions to flavor, delivering just the right amount of tartness without linger or off-notes. “Sometimes, it’s used at levels so low you can’t detect any sourness, but it’s still adding to the complexity of the final flavor,” Bohlmann says. Beverages, powdered drink mixes, candies, jams and jellies are just a few of the places where citric acid is regularly used for its flavor-enhancing capabilities.

As an acid, it also serves as a preservative and shelf-life extender, lowering a food system’s pH and thereby inhibiting growth of unwanted bacteria, mold, fungi and the like. Citric acid is especially valuable in shorter shelf-life products like bakery, dairy and meat applications, where it protects foods against spoilage and the growth of pathogenic organisms, while making the product taste better and last longer. It also significantly slows oxidation, contributing to color stability… which explains its use as an antioxidant in creams, mayonnaises, sauces and even fats and oils.

Citric acid’s other major functional roles as a chelant and chemical intermediate make it a go-to ingredient in many pharmaceutical, detergent and industrial applications. “Here again, manufacturers get the benefit of using a fermentation-derived ingredient to replace petroleum-sourced alternatives,” Guseyn-Zade emphasizes.

Whether used in food or industrial applications, formulators often count on citric acid to enhance product performance by accomplishing multiple functions at once. In the food and beverage space, that typically means assisting with food preservation while also contributing to flavor development and color stability.

“I call this the ‘pocketknife effect’ because just like my Swiss army knife, it can do so much,” Bohlmann explains. “Food manufacturers use it to get the pH of a food product into the right range for preservative reasons, but they also get this great taste benefit, enhanced color stability and more. No other organic or mineral acid can fill all those roles.”

The Cargill advantage

For maximum flexibility, Cargill offers both liquid and powdered versions of citric acid and supports customers with a reliable and high-quality supply. The company also offers two key citric salts: sodium citrate and potassium citrate. These ingredients bring a different range of benefits, depending on the application. For example, one of the larger applications for sodium citrate is processed cheese, where its emulsifying properties help stabilize dairy proteins for the perfect, smooth melt. Potassium citrate, on the other hand, is often used as a preservative in low-sodium foods. Both of these citrate salts are also used in pharmaceuticals.

While citric acid has long been a staple of the food industry, Guseyn-Zade contends that there’s ample reason for food and industrial manufacturers to re-discover the time-tested ingredient. “There’s so much pressure on brands to clean up their labels, shorten ingredient lists, and remove petroleum-derived preservatives and flavorants,” he explains. “Here’s an ingredient packed with positives that can help brands do all that and more. Partner with Cargill, and let us show you the possibilities.”

Learn more about what citric acid can do for your products and label at **cargill.com**.

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