FOOD PROCESSING

INGREDIENTS > SWEETENING SOLUTIONS

Stevia, Monk Fruit and Allulose Provide Other Ways To Be Sweet

The trio of sweeteners provides natural sweetness, but sugar's functional attributes must also be replaced.

Dave Fusaro
Anne-marie Ramo

There is no shortage of sugar substitutes on the market. As consumers increase their demand for low- or no-sugar products, ingredient suppliers are answering with products to assist the product formulator.

Natural sweeteners that look good on the label are the order of the day, as long as they meet or exceed taste expectations. Gone are the days when a consumer will tolerate a bitter aftertaste with their sweet treats just to shave a few calories.

Stevia remains the star among natural and plant-based sweeteners. But emerging ingredients such as allulose and monk fruit also address consumer demands for healthy sugar alternatives.

The clean-label movement is also influencing the reduced-sugar trend. Research suggests that sugar reduction was 61% more important to consumers shopping for clean-label. High-intensity plant-based sweeteners, such as stevia and monk fruit, help meet this need because they are becoming recognizable on a label.

As much as consumers love the concept of sugar substitutes, they don't always love the reality. Consumers' common complaints about non-nutritive sweeteners include unnatural taste, poor aftertaste and unsuitably high levels of sweetness. Even worse if it's a truly synthetic sweetener with a chemical-sounding name.

"Beverage makers have been utilizing artificial sweeteners such as aspartame and sucralose but are increasingly, at the demand of consumers, relying on sweeteners with more of a natural halo, such as monk fruit, stevia and erythritol," says Lucia Stan, business manager for U.S./Canadian sugar reduction & specialty sweeteners at Ingredion Inc.

"In bakery and confectionery, the more common ingredients used to reduce

sugar are polyols and allulose," she continues. "Allulose, one of the newer tools in the sugar reduction space, has been increasingly utilized in dairy, sometimes along with high natural potency sweeteners."

Not just sweetening

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The taste issue is only the tip of the iceberg for formulators wanting to reduce or eliminate sugar in formulations. The extensive functions of sugars -- freezing point depression, crystallization, browning, viscosity/consistency, solubility and starch gelatinization -- are but gone with non-nutritive sweeteners.

In more complex food systems, such as ice cream or baked goods, sugar substitutes require multiple ingredients to compensate for the loss of functionality caused by the removal of sucrose. Careful selection of a combination of components, such as allulose and the right amount of soluble corn fiber, for example, can provide a cost-effective solution for extending the shelf life, improving the texture and maintaining optimum flavor.

Sugar also affects shelf life and plays a crucial role in water management and microbial control. So, when formulators of frozen dairy products replace sugar with high-intensity sweeteners, they must add or adjust ingredients like stabilizers and emulsifiers to provide more effective moisture control.

Ice cream can be particularly difficult to make because it has so much sugar, which affects the freezing point and many sensory attributes. Erythritol can help replicate some of the functionality of sugar, especially freezing point depression. To replace sugar's sweetness, erythritol is frequently combined with stevia and additional bulking agents such as inulin to improve mouthfeel.

Plant-based foods are problematic

Replacing or reducing sugar in an increasing number of plant-based foods and beverages presents product developers with even more formulation challenges. Bitterness and chalkiness are typical formulation and flavor issues in plant-based applications and have traditionally been addressed with sugar.

Natural plant-based sweeteners like stevia and monk fruit provide developers with a choice of sweeteners that fit exactly what consumers are looking for on-label and the functional advantages needed to overcome these formulation challenges. By combining mild sweetness with fiber, natural bulk sweeteners can play to plant-based products' strengths while helping mask imperfections.

BioNeutra produces VitaFiber DX, a sugar substitute with a high fiber and prebiotic content. It can increase the fiber content in foods or beverages while reducing sugar and calories, all while keeping taste, texture and mouthfeel intact. VitaFiber's Imo and Plus plant-based sweeteners are used as standalone ingredients or combined with high-intensity sweeteners to mask bitterness.

Stevia continues to capitalize on its fame as a natural alternative to synthetic sweeteners. Research by Tate & Lyle shows that 42% of consumers are aware of stevia and 29% are likely or very likely to buy products that contain stevia, with intentions to purchase stevia similar to intentions to buy sugar.

The heat-stable and non-caloric steviol glycosides in the stevia plant are 150

to 300 times sweeter than sugar. The use of stevia continues to grow as the stevia portfolio expands beyond the original glycoside rebaudioside A, which has a bitter or licorice-like off-flavor. Rare rebaudiosides reb M and reb D taste the most like sugar but are found in much smaller quantities in the stevia plant. However, fermentation is producing these molecules more cost effectively.

SweeGen has an extensive natural sweetener portfolio, including Bestevia Reb I for a variety of applications, including dairy, beverages, bars and other confectionary formulas. The Bestevia line also includes rebaudiosides B, D, E and M.

Allulose on a roll

Allulose, a monosaccharide isomer of fructose, has been on a meteoric rise the past three years. It's known as a "rare sugar" because it's found in small amounts in maple syrup, brown and caramel sauces, and fruits like raisins and figs. The sweetener got a boost in 2019 when the FDA declared allulose could be excluded from the total sugar on nutrition panels because it contains virtually no calories.

SilkySweet is based on non-bioengineered allulose plus monk fruit and a proprietary sweetener.

Mixing allulose, stevia, erythritol, monk fruit and other natural sweeteners in specific combinations is an effective way to overcome these sweeteners' functional and flavor issues. For example, stevia sweeteners typically impart longer-lasting sweetness to foods than sucrose, and adding allulose can help formulators achieve improved sweetness without off flavors.

SilkySweet is one of those combinations. New on the market, it's based on non-bioengineered allulose plus monk fruit and a proprietary sweetener "that matches the profile of stevia," says Chuck Nix of Silky Smooth MicroCreamery. It actually has nine ingredients, including bitterness maskers, flavor modulators, flavor enhancers "and a pinch of sea salt," enabling Nix to call it "the world's first flavor-enhancing sweetener."

To showcase the product, his company created Keto Cola. Nix also is taking aim at the confectionery market. "All sugar-free chocolate is substandard quality, but that problem can be solved with SilkySweet," he says. "We are now in the labs of three of the world's top chocolate manufacturers."

The sweet combination of stevia and monk fruit works a little magic as one sweetener helps mask the other's unpleasant attributes. Monk fruit carries a slightly off note reminiscent of melon rind, and stevia has a slight note of licorice. However, in combination, these off notes cancel each other out, providing pleasant sweetness with no undesirable aftertastes.

At Batory Foods, development aimed at reducing or replacing sugar includes sweetener blends like the Batory Sweet Essentials blend, which contains combinations of stevia leaf extract, steviol glycoside, erythritol and allulose.

The Batory Sweet Essentials line contains five high-intensity sweetener blends, including B-Tru, B-Intense, B-Fiber, B-Clear (E) and B-Clear (A). These interchangeable sweeteners can be used in virtually any dairy, frozen food, snack, baking and beverage application.

Making sucrose better

Some manufacturers are finding new ways to work with sucrose itself in an effort to find delivery systems that will heighten flavor while reducing the need for straight sugar in formulation.

Rather than substituting new ingredients for sugar, BlueTree Technologies (bluetree-tech.com), an Israeli startup, has developed “a technology, a system and a product” that selectively removes some of the sugar from products, especially high-sugar natural juices. Filtration and absorption techniques remove disaccharides and leave in monosaccharides, reducing reportable sugars by up to 50% but maintaining the sweetness and mouthfeel.

DouxMatok makes Incredo Sugar with a patented process that improves the efficiency of sugar’s ability to deliver to the sweet taste receptors. This allows for a sugar reduction of 30-50%. It enhances the perception of sweetness, allowing considerable sugar reduction without compromising taste, mouthfeel or texture.

Silica is the product carrier, delivering sugar to the taste buds more efficiently. Sugar molecules form clusters onto this large-surface mineral that release next to the receptors, resulting in a more pronounced perception of sweetness.

Polyols such as sorbitol, maltitol, mannitol, erythritol, xylitol and isomalt are some of the more popular polyols used in place of sugar. In addition, some can be used as bulking agents, replacing some of the heft and mouthfeel of regular sugar.

However, polyols have a lower melting point than sugar, so any recipes that involve heat may require some adjustments. Additionally, polyols tend to be more hygroscopic than sugar, retaining moisture more readily. This can be an issue in low-moisture products, as the polyols can absorb moisture from the surrounding environment, resulting in a product that is more prone to spoilage and spoilage organisms.

Sadly, none of these fantastic sugar substitutes comes without a cost. Most are more expensive than sugar. However, with sweetness levels 100+ times that of sugar, less product can be used, therefore offsetting at least some of the additional expense.

When formulating and processing products with sugar alternatives, it is essential to consider how the sweeteners will interact with other ingredients and the impact on the product's taste, texture and stability.