# SFC-CSA Meeting Report: Focus on Ingredients

## Stevia and natural aromatic extracts

*Elderflower*

*Stevia*

Stevia (*Stevia rebaudiana* Bertoni) is "very easy to grow," said Michael Britten-Kelly, Treatt USA's natural products manager, during the fall meeting of the Society of Flavor Chemists and Chemical Sources Association. However, the plant, sought-after for the natural sweetening properties of its extracts, grows best in temperate climates. Today, stevia is primarily grown in China, though U.S. domestic large-scale growing is taking place in California, Georgia and North Carolina.

The extract contains at least 11 stevia glycosides; the four major components focused upon in commerce are rebaudioside A, C, D and the stevioside. Britten-Kelly explained, "Because of the complex constitution of the extracts in the marketplace, people will often find that from one manufacturer to another, one person's 95% stevia is different from another person's 95% stevia and it has to do with the balance of all these components."

A large number of stevia extracts have been self-declared as GRAS without objection by the U.S. Food and Drug Administration. Stevia leaves are not acceptable in foods. Extracts have to be purified to at least 95% stevia glycosides. The European Union has set up a stevia standard that is equivalent to about 200 ppm of stevioside and 240 ppm of rebaudioside A.

"The problems with stevia, I think, are well known to those of you who worked with it," said Britten-Kelly. "There's no question that when you taste it, there's a delay in sweetness relative to sucrose. Sucrose is obviously the best. In our experience, we found out the sweetness effect of the stevia extract tops out at about 200 ppm ... for some people less, for some people more. As you add more above 200 ppm, you get more bitterness and not much more sweetness."

*Michael Britten-Kelly (Treatt)*

*Steve Pearce (Omega Ingredients)*

Stevia's infamous unpleasant aftertaste is well-known, as is its sweetness' tendency to linger. "There's an adaptation where after you take three or four sips of a stevia-sweetened beverage, you can't taste any more sweetness," said Britten-Kelly. "It goes away and then it comes back and then it goes away. The sweetness tends to linger longer than people would like, but that's a characteristic that shows [up] with all high-intensity sweeteners."

Food scientist Thomas Hofmann of Munich University and his colleagues have performed numerous studies on taste receptors, Britten-Kelly explained. Hofmann used 10 tasters who could detect levels of sweetness and bitterness. They tasted the main glycosides in stevia to see what were the taste thresholds and maximum sweetness. They found that most of the components of stevia glycosides have a higher bitterness threshold than a sweetness threshold (that's about 200 ppm). Bitterness is noticeable when using these components. What formulators should look for is a large difference between the two, maximizing sweetness and minimizing bitterness.

"Hopefully you'll find a stevia mix that will be higher in the components that have a wide gap between bitterness and sweetness because that's the area where you're going to be able to work to the best extent," said Britten-Kelly.

"Rebaudioside D is the sweetest component in stevia," he said. "Rebaudioside D is the champion for high sweetness, low bitterness … It gives terrific maximal sweetness; it doesn't really seem to max out on the bitterness. It remains low even at higher concentrations."

Meanwhile, rebaudioside C has high bitterness and very low sweetness.

Stevioside and rebaudioside A have a maximum of what they can deliver with sweetness. Chemists can enzymatically add

another glucose unit and convert stevioside or rebaudioside A or any of the other components into something that has more glucose units on it and improve sweetness. "That idea is already out there and I'm sure there are chemists preparing new versions of the steviol glycosides," Britten-Kelly added. "They may not be nature identical, but they will have much better sweetness characteristics."

During the talk, Britten-Kelly demonstrated his company's TreattSweet flavoring ingredient, which is intended to make sweet flavors taste better and can be used in conjunction with stevia. The audience tasted 200 ppm of rebaudioside A with still water; while not a complete sensory solution, a sweetening effect was noticeable. In-use, the product can accelerate sweetness impact, improve sweetness and diminish bitterness on the back end, while also being smoothing and improve mouthfeel. Above 1,000 ppm, TreattSweet can have a mild melon, vanilla, apple and honey impression. At around 250 ppm, the material works well with rebaudioside A. Effects can be detected at levels as low as 50 ppm.

Meanwhile, Steve Pearce, founder of Omega Ingredients, discussed natural ingredients, including elderflower extract from U.K.-sourced flowers. The light, floral material is appropriate for use in apple and pear profiles.

Black currant essence English extra was fresh, sulfury and juicy, appropriate for use in passion fruit, mango and other tropical flavors.

Gooseberry essence Scottish is ideal for apple, pear and passion fruit, while also enhancing apricot and peach flavors.

A kosher beer distillate was sweet, fermented and beerlike, useful in fruit, apple and pear profiles. The distillate can also be used to enhance beer and sweetness character in nonalcoholic beer.

Saffron extract Spanish possessed a slightly spicy, metallic character useful in culinary applications and to enhance spice notes.

Apple oil had an intense green apple character with nuances of pear, spice and raisin. High in *cis*-3-hexenol, the ingredient is good for beverages, chocolates and perfumes.

Heliotropin natural was sweet, floral, powdery, and coconut- and vanillalike. It was suggested for vanilla, berry, fudge and dairy flavors.

Popcorn pyrimidine artificial had an intense popcorn, corn, tortilla chip and nutty character appropriate for application in nut and popcorn flavors, tortilla chips, savory profiles, sausages and milk.

A chocolate key natural was sweet, chocolate, creamy with nuances of vanilla and English milk chocolate flavor, appropriate for chocolate flavors and enhancing cocoa and coffee profiles.

A green key natural was powerful, green, leafy, grasslike and fresh, appropriate for enhancing green notes, for instance, in apple and pear.

Finally, a beef key natural was powerful, meaty, beefy, roasted with fatty nuances, appropriate for enhancing beef and other meat flavors.