Scientists reduce sweetener stevia's bitter bits

11 November 2015, by Blaine Friedlander

Passing by stevia plants, a group of student walks through the International Crops and Weed Garden at the Cornell Plantations. Credit: Lauren Thiersch

Good news for consumers with a sweet tooth. Cornell food scientists have reduced the sweetener stevia's bitter aftertaste by physical – rather than chemical – means, as noted in the Oct. 14 issue of the journal *Food Chemistry*.

"The food industry constantly evaluates and uses several alternate high-intensity sweeteners to duplicate the taste of sugar, usually with no calories," said Samriddh Mudgal, M.S. '15, lead author of the study. "Growing demand for natural ingredients have led to the rising popularity of steviol glycosides, which are natural sweeteners extracted from stevia leaves. They've been in use for centuries in South America. Since these steviol glycosides have a negligible effect on blood glucose, it is an attractive, natural sweetener for people on carbohydrate-controlled diets."

Joining Mudgal on the research, "Controlling the Taste Receptor Accessible Structure of Rebaudioside A via Binding to Bovine Serum Albumin," were Ivan Keresztes, director of Cornell's NMR facility in the Department of Chemistry and Chemical Biology; Gerald W. Feigenson, professor of biochemistry, molecular and cell biology; and and Syed Rizvi, professor of food process engineering.

The findings could encourage the beverage industry, packaged dressings, cream sauces, powdered soups and dairy products to use more stevia.

While previous studies have focused on masking taste receptors, Mudgal and his colleagues took a different approach. One of stevia's components is rebaudioside A – known as Reb A – the glycoside molecule that provides its sugary taste but yields a speck of bitterness that limits the sweetener's commercial possibilities. When tasted now, Reb A activates two bitter receptors – hTAS2R4 and hTAS2R14 – on the human tongue.

The researchers modified Reb A by applying "hydrophobic effects" to the bovine serum albumin protein, which creates a stable Reb A-protein

complex – and it essentially dissipates the Reb A molecular components. This protein solution disengages stevia's bitter components, as the human tongue's bitter receptors hTAS2R4 and hTAS2R14 are less likely to recognize the modified Reb A-protein complex.

The researchers tested the modified protein's sturdiness in orange juice and found the sweet binding remained intact. Said Mudgal: "It's a chemical-free, economical and purely physical interaction-based approach to control Reb A's interaction with taste receptors, which will bolster its taste profile."

Provided by Cornell University