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HOW SWEET IT ISN'T – PREFERENCE FOR ALTERNATIVES TO SUGAR BASED ON SOUR, BITTER TASTES

COLUMBUS , Ohio – The most important factor in what kind of sweetener people prefer has little to do with how sweet it tastes. Rather, it has more to do with other tastes in the sweetener, such as bitterness or sourness, new research suggests.

Food scientists at Ohio State University asked 30 college students to rate 13 different sweeteners and sweet substances, including sugar, based on how much bitter, sour and metallic tastes they perceived with each substance. Many of these compounds are found in items such as diet soda, gum, candy and Jell-O, and some can be used for baking.

Not surprisingly, sugar was rated highest. Participants found sucralose (brand name Splenda), a sweetener derived from sugar, the most acceptable alternative to sugar. The researchers attribute this to a lack of noticeable sour and bitter tastes in this sweetener.

“So many sugar substitutes also have unpleasant tastes,” said [Jeannine Delwiche](#), a study co-author and an assistant professor of [food science and technology at Ohio State University](#).

“Understanding how people perceive these tastes may help create a sugar substitute that is more palatable. That ultimately means making tastier products with fewer calories.”

“Sugar is the gold standard for companies that make artificial sweeteners,” said Delwiche, who also directs [Ohio State's Sensory Science Group](#). “But it's packed with calories. Most of these other substances have few to no calories.”

The researchers asked the 30 panelists to rate the sweet, bitter, sour and metallic tastes that accompanied the 13 sweeteners and sweet substances. Most of the substances sampled in this study are already used by the food industry.

Delwiche and study co-author Amanda Warnock, a former graduate student in food science at Ohio State, presented their findings March 28 in Atlanta at the annual meeting of the [American Chemical Society](#).

The researchers asked the 30 panelists to rate the sweet, bitter, sour and metallic tastes that accompanied the 13 sweeteners and sweet substances. Each participant rinsed his or her mouth out thoroughly with water between tasting small samples of each compound. Most of the substances sampled in this study are already used by the food industry.

A few of the sweet substances listed aren't typically used by the food industry as sweeteners. However, the researchers wanted to know how the panelists reacted to a variety of sweet substances; in the future this information may lead to better-tasting sweeteners. (See the side bar for a complete list of the sweeteners and sweet substances used in this study.)

In the first of three sessions, participants rated their overall liking and acceptance of the sweet compounds. In the second and third sessions, each panelist rated the sweet, sour, bitter and metallic intensities of each sample.

The results showed that the sweeteners that the participants liked best had no, or next to no, sour, bitter or metallic tastes.

Next to sugar and sucralose, the panelists liked xylitol best. Xylitol is used primarily in chewing gum. Aspartame (sold under the brand names Equal and Nutra Sweet) and fructose were also highly rated. The panelists liked stevia, saccharin, D-tryptophan and glycine the least.

"Most of these last four substances have pronounced bitter, sour or metallic tastes," Delwiche said.

SWEETENERS RATED BY PANELISTS

The sweeteners and sweet substances used in this study are listed below, with brand names mentioned in parentheses for the more common sugar alternatives:

Sucrose (table sugar)

Sucralose (Splenda)

Aspartame (Equal or Nutra Sweet)

Saccharin (Sweet'N Low)

Acesulfame potassium (Sweet One or Sunett)

Xylitol (a sweetener primarily used in chewing gum)

Stevioside (an extremely sweet herb commercially sold as stevia)

Cyclamate (a sweetener banned from use in food production in the United States, but widely used throughout the rest of the world. The researchers secured approval for using this sweetener in their study.)

D-tryptophan (an amino acid, or protein building block, with a sweet taste; not used as a food sweetener)

The rest of the substances – thaumatin, cyclamate, acesulfame potassium and glucose – were ranked in between the most-preferred and the least-liked compounds.

Glycine (a sweet-tasting amino acid; not typically used to sweeten foods)

Thaumatococcus (sweet-tasting amino acids derived from katemfe, a fruit native to west Africa; not typically used to sweeten foods, as it's very expensive, Delwiche said.)

Delwiche plans to continue this work and include larger groups of participants to figure out what drives individual differences in taste perception.

Fructose (the kind of sugar found in fruit and the main component of high fructose corn syrup)

Glucose (called dextrose by the food industry; dextrose is derived from honey and sweet fruits)

“There is a need for much more research to fully understand how people perceive sweet tastes,” she said.

This project was self-funded; the researchers received no financial support for this work from any of the sweetener manufacturers.

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