PURECIRCLE STEVIA INSTITUTE℠

STEVIA SCIENCE & SAFETY

The stevia plant was discovered over 200 years ago in South America where the indigenous people have traditionally used the leaves to sweeten beverages, or chewed on them for their sweet taste. Today, high-purity extracts from the stevia plant are used globally as a naturally-sourced, zero-calorie sustainable sweetening ingredient in foods and beverages, making it ideal for people who want zero-calorie sweetness from a natural source.

ORIGINS

The scientific name for the stevia plant is Stevia rebaudiana Bertoni, a member of the Asteraceae (sunflower) family, native to South America. In 1887, Dr Moises Santiago Bertoni, a Swiss-Paraguayan botanist, described his discovery of the plant. Then, in the 1930s two French chemists isolated the steviol glycosides, the molecules that give stevia their sweet taste. Great tasting stevia is now grown by small farmers as well as on a commercial scale due to an evolution of stevia leaf cultivation, improved sustainability in harvesting, production and more precise extraction. Stevia is cultivated mostly in China, Paraguay, Kenya and the United States. In addition to these primary regions stevia is also being cultivated in Argentina, Brazil, Columbia, India and Vietnam.

EXTRACTING STEVIA'S SWEETNESS

High-purity stevia is extracted and purified from stevia leaves in a manner that is similar to that of sucrose from sugar cane. The extraction process involves steeping the dried leaves, similar to making tea, and then separating and purifying the best tasting steviol glycosides (Ashwell, 2015). Recent research provides evidence which shows the extraction and purification process does not alter the structure of the steviol glycosides (SGs), so these sweet molecules (i.e., SGs) found in the sweetener ingredient end product are the same as those in the leaf (Oehme, 2017).

ACHIEVING THE PERFECT TASTE NATURALLY

There are more than 40 SGs in the stevia leaf that are 50—350 times sweeter than sugar (Ashwell, 2016; Purkayastha, 2016). High-purity stevia leaf extracts may contain either a single steviol glycoside (e.g., rebaudioside A) or several SGs. Rebaudioside A (Reb A) is one of the most abundant SGs in the stevia plant and was the first launched SG in the marketplace. Recent advances in stevia agronomy has resulted in traditional non-GMO breeding techniques which have created new varieties of the stevia plant that contain higher levels of the more sugar-like SGs such as, rebaudioside M and rebaudioside D.

With stevia, the key to developing reduced or no added-sugar food and beverage products lies in combining multiple SGs to achieve the desired sweet taste without the added calories. Recent science and innovations point to taste advantages which are far superior when using unique combinations of SGs for different food product matrixes versus the use of any single SG such as Reb A or Reb M alone.

The PureCircle Stevia Institute (PCSI) provides science-based information about stevia, nature's zero-calorie sustainable sweetener. For more details, visit **www.purecirclesteviainstitute.com.**

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To date, high-purity stevia leaf extracts are approved for use in a broad selection of food and beverage categories in more than 150 countries. Stevia was first commercialized as a sweetener in Japan in the 1970s, and over 200 studies support stevia's science and safety.

After a series of reviews and approvals of stevia, the safety of stevia leaf extract, i.e., steviol glycosides (SGs) with an acceptable daily intake (ADI) of 0 - 4 mg/kg body weight (on a steviol basis) was established by the Joint FAO/WHO Expert Committee on Food Additives in 2008 (JECFA; FAO/WHO, 2008/2009). The purity of stevia sweetener is an important aspect in the context of stevia safety. A high-purity stevia specification, with nine* SGs at a minimum 95% purity was established by the Codex Alimentarius Committee in 2010 (FAO/WHO, 2010). On the basis of a favorable scientific opinion by the European Food Safety Authority (EFSA, 2010), approval by the European Commission was granted in 2011 for the use of stevia in Europe. At the same time, the United States (US) safety evaluations progressed and high-purity Reb A received GRAS status with a no-objection from the Food and Drug Administration in 2008 (US FDA; GRN 252, 2008). Since then, SGs Reb E and Reb M have been approved in some countries/regions, and several additional SG compositions have obtained US GRAS status. Recently, US GRAS status was obtained for a high-purity stevia leaf extract composition which comprises of more than 40 SGs at 95% purity or higher (GRN 619, 2016). In addition, JECFA has also reviewed the safety and applicability of more recent science on SGs and approved the use of a stevia leaf extract composition of more than 40 SGs at 95% purity or higher (FAO/WHO, 2016/2017). The Codex Alimentarius Committee is expected to adopt and establish a new revised specification for all 40+ SGs by the year 2018. The adoption of which will open up the possibility for greater innovation with stevia across the world. In general, regulatory authorities have determined high-purity stevia leaf extract to be safe for the family including pregnant women, people with diabetes and children.

Steviol glycosides when consumed, pass through the upper gastrointestinal tract to the colon. Gut bacteria in the colon snip off the sugar units (e.g., glucose) on the SG molecule and use them as an energy source. The remaining steviol backbone is absorbed and metabolized by the liver to steviol glucuronide, which in humans, is primarily excreted in the urine (Gardana, 2003). Recent data indicates both major and minor SGs share the same metabolic fate (Purkayastha, 2016). No significant energy is obtained, thus making stevia a zero calorie sweetener.

Due to the rising incidence of health issues including diabetes, overweight and obesity across the globe, health policies and dietary guidelines recommend a reduction in both calories and sugar. Stevia leaf extract contributes no carbohydrates or calories, and as part of a healthy diet is appropriate for use by those trying to manage blood glucose, as well as for those trying to manage a healthy weight. Research to date shows that low-calorie sweeteners help reduce both energy intake and body weight (Miller, 2014; Rogers, 2016). And, studies show reduced calorie/sugar foods with stevia help reduce energy intake and blood glucose with no adverse effects in diabetics or healthy adults (Anton, 2010; Maki, 2008; Maki, 2009).

Stevia provides the industry and consumers with a unique opportunity to reduce both sugar and energy intake in an environment that desires clean label and natural-origin ingredients. In doing so, it's an opportunity to address nutrition and health policy goals amidst a global health crisis, and helps consumers achieve healthier lifestyles.

*The nine SGs: Rubusoside, Steviolbioside, Dulcoside A, Stevioside, Rebaudioside B, Rebaudioside A, Rebaudioside C, Rebaudioside F, Rebaudioside D.

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