

Benefits of Stevia

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Over the last two decades, the consumption of sugar-sweetened foods and beverages in the United States has risen to a point where an average of 22 teaspoons of sugar are consumed per day (Horowitz, 2013). In order to curb the consumption of common nutritive (caloric) sweeteners (e.g. sucrose, fructose) and attenuate their deleterious effects, stevia is a good non-nutritive (non-caloric) sweetener option. Stevia has had a long history as a natural sugar substitute and flavoring ingredient (Ashwell, 2015).

Stevia (*Stevia rebaudiana*) is one of the most well-studied and widely used natural sugar substitutes proven safe for human consumption (Ashwell, 2015; Boileau, Fry, & Murray, 2012). Stevia has been consumed for over 200 years since its discovery in 1899 by Moises Santiago de Bertoni in Paraguay (Boileau et al., 2012). The stevia plant (shrub-like and relative of the sunflower) is native to South America, but *S. rebaudiana* is grown all over the world including the United States and Asia (Boileau et al., 2012; Christaki, Bonos, Giannenas, Karatzia, & Florou-Paneri, 2013). The sweetness comes from compounds (steviol glycosides) in the leaf that when purified, tastes about 200-300 times sweeter than sucrose (Boileau et al., 2012; Lemus-Mondaca, Vega-Gálvez, Zura-Bravo, & Ah-Hen, 2012). For that reason, stevia is categorized as a high-potency (intense) sweetener (Boileau et al., 2012). Stevia leaves contain nutritional value including proteins, essential amino acids, vitamins, and minerals; stevia has antioxidant, anti-hyperglycemic, anti-hypertensive, anti-inflammatory/immunomodulatory effects as well as aiding digestion (Arora et al., 2010; Christaki et al., 2013). Stevia has been used as a stable substitute for saccharose in the treatment of diabetes, obesity, hypertension, inflammation, and cancer (Christaki et al., 2013). No mutagenetic/carcinogenetic properties nor toxicity were found with stevia usage (Christaki et al., 2013). Furthermore, steviol glycosides (including any

by-products) metabolize and are excreted in urine without any unnatural accumulation (Ashwell, 2015). Stevia's many beneficial properties make it a good plant-based, natural sugar substitute. Stevia has been successfully introduced into many foods and beverages.

The biochemical nature of stevia as a high-potency sweetener allows it to be very palatable and easily introduced into consumer foods and beverages (thereby reducing the need for other caloric sweeteners). Japan pioneered using stevia as a sweetener in the Asian food and drug industry; stevia has since expanded into China, Malaysia, Singapore, South Korea, Taiwan, and Thailand (Lemus-Mondaca et al., 2012). Stevia (usually in powder form) is thermostable up to 200 degrees Celsius which makes it useful in cooking and baking without undergoing too much browning/caramelization (Maillard effect) (Lemus-Mondaca et al., 2012). Stevia combines well in hot/cold applications; aids the formation/stabilization of emulsions (e.g. cake batters, dairy products, frozen desserts); has reasonable fat absorption similar to oil allowing it to be used as binder/flavor-retainer; has pleasurable mouthfeel and no unpleasant after-taste (Lemus-Mondaca et al., 2012). Stevia is an excellent candidate as a non-caloric sweetener.

Based on stevia's long-standing performance, several forms of stevia (e.g. stevioside, rebaudioside A) have been accepted as food supplements and as food additives (Abdel-Rahman et al., 2011). "Stevia" today refers to a highly purified stevia leaf extract (not raw leaves) which was approved in 2008 by the Joint Food and Agriculture Organization/World Health Organization (WHO) Expert Committee (JECFA) on Food Additives and Codex Alimentarius for usage in beverages and foods (Ashwell, 2015). JECFA established an acceptable daily intake (ADI) for stevia glycosides as 0-4 mg/kg body weight (expressed as steviol equivalents) (Abdel-Rahman et al., 2011). Based on the ADI, the U.S. Food and Drug Administration (FDA) received several GRAS (generally recognized as safe) notices for rebaudioside A and stevioside as food

sweeteners (Abdel-Rahman et al., 2011). The European Food Safety Authority (EFSA) concurred with JECFA and also deemed stevia safe for consumption (Boileau et al., 2012). Stevia's safety record makes it a good choice for a non-caloric sweetener.

Stevia is a healthful and viable option as a non-nutritive sweetener. Stevia has many healthful properties without mutagenic, carcinogenic, and toxicity effects which are a cause for concern with other artificial sweeteners. In addition to being a natural, plant-based sweetener, stevia's composition makes it a very compatible ingredient in both foods and beverages. The JECFA, EFSA, and FDA have approved the use of stevia. Consumers looking for a non-caloric sweetener should be able to confidently consider using stevia.

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