

# SWEETENERS

## you might find in your food

There are many different sweeteners in our food supply today that might be used as an alternative to table sugar. Here is some basic information about some of the most popular caloric, low- and non-caloric sweeteners, including real sugar as a comparison.



CALORIC									
Sugar	Agave	Brown Rice Syrup	Coconut Sugar	Date Sugar	Dextrose	Fruit Juice Concentrate	High Fructose Corn Syrup (HFCS)	Honey	Maltodextrin
<b>SOURCE:</b> Sugar beet and sugar cane plants	<b>SOURCE:</b> Agave Plant	<b>SOURCE:</b> Rice	<b>SOURCE:</b> Flower of the coconut plant	<b>SOURCE:</b> Dates	<b>SOURCE:</b> Corn or Wheat	<b>SOURCE:</b> Fruit varieties	<b>SOURCE:</b> Corn	<b>SOURCE:</b> Nectar collected by bees	<b>SOURCE:</b> Corn or Wheat
<b>SUGARS:</b> Sucrose	<b>SUGARS:</b> Fructose (55-90%), glucose	<b>SUGARS:</b> Glucose, maltose, maltotriose	<b>SUGARS:</b> Sucrose, glucose, fructose	<b>SUGARS:</b> Glucose, fructose, sucrose	<b>SUGARS:</b> Glucose	<b>SUGARS:</b> Sucrose, glucose, fructose	<b>SUGARS:</b> Fructose (55% or 42%), glucose (45% or 58%)	<b>SUGARS:</b> Fructose, glucose	<b>SUGARS:</b> Glucose
Calories per teaspoon: <b>15</b>	Calories per teaspoon: <b>21</b>	Calories per teaspoon: <b>16</b>	Calories per teaspoon: <b>15</b>	Calories per teaspoon: <b>11</b>	Calories per teaspoon: <b>16</b>	Calories per teaspoon: <b>~16</b>	Calories per teaspoon: <b>17</b>	Calories per teaspoon: <b>20</b>	Calories per teaspoon: <b>15</b>
<b>GI:</b> moderate	<b>GI:</b> low	<b>GI:</b> high	<b>GI:</b> low	<b>GI:</b> low	<b>GI:</b> high	<b>GI:</b> unknown	<b>GI:</b> moderate	<b>GI:</b> low ↔ high	<b>GI:</b> high

### SWEETNESS COMPARED TO SUGAR

Standard for sweetness	30-40% sweeter	30% less sweet	Equal sweetness	Less sweet	25% less sweet	Less sweet	120-160 times sweeter	variable	10% as sweet
<b>PRODUCTION</b> After sugar beet and sugar cane plants are harvested, sugar is removed from the plant through crushing, cutting and boiling. It is then filtered, washed and crystallized to produce the sugar we find in our pantries.	<b>PRODUCTION</b> The leaves of the plant are cut and crushed to extract the sap. The sap is filtered, heated and treated enzymatically to convert the fructans (not very sweet) to fructose and glucose.	<b>PRODUCTION</b> Rice dextrin is produced by removing the hemicellulose, protein and lipid fractions from the brown rice. The rice dextrin then goes through further steps to convert polysaccharides to predominantly monosaccharides.	<b>PRODUCTION</b> Made from sap of the coconut blossom. Sap is collected and boiled down to a thick syrup, cooled into blocks and broken into granulated sugar.	<b>PRODUCTION</b> Made from powdering dried dates. Commercial varieties may have a flowing agent added (like oat flour) to help reduce clumping.	<b>PRODUCTION</b> Dextrose is most commonly produced from cornstarch, though starch can come from any kind of plant. The process involved enzymatic breakdown of the starch polymers to single glucose units, which is similar to how our bodies breakdown starch.	<b>PRODUCTION</b> Made by evaporating most of the water from the fruit puree, concentrating the natural sugar content.	<b>PRODUCTION</b> Corn syrup is made from cornstarch. The cornstarch is processed enzymatically by glucose isomerase to convert some of the glucose into fructose. To develop HFCS, this process is taken further to convert more glucose.	<b>PRODUCTION</b> Produced by bees, honey is harvested by bee keepers and the filtered/ processed commercially. Taste, color and flavor all depend on the types of flowers the bees have collected nectar from. Basic commercial honey tends to be a mix of different nectars to help ensure consistency and flavor.	<b>PRODUCTION</b> Produced by processing starch (most commonly corn), using acids or enzymes to break it down.
<b>NOTES</b> While all green plants make sucrose through photosynthesis, sugar beet and cane plants make the greatest quantities of sugar.	<b>NOTES</b> Takes about seven years for the sugar content of the plant to reach a reasonable level for harvesting.	<b>NOTES</b> A mild-flavored sweetener, also known as a maltose-based sweetener or rice malt syrup.	<b>NOTES</b> Considered a partially refined sugar and is similar in color, flavor and sweetness as brown sugar. May retain a small amount of micronutrients.	<b>NOTES</b> Looks a lot like brown sugar but cannot simply replace brown sugar in recipes as it does not dissolve in water or melt, and therefore does not incorporate well into mixtures.	<b>NOTES</b> Most commonly used in beer making.	<b>NOTES</b> Can contain traces of vitamins and minerals.	<b>NOTES</b> The higher fructose variety is often used in soft drinks and the lower fructose version is used more in cakes.	<b>NOTES</b> GI ranges are dependent on where the honey has been collected. Commercial honey blends tend to be high (GI>70).	<b>NOTES</b> Commonly added to processed foods to provide bulk and texture and help blend ingredients together.

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**Calorie free?** In order for tabletop sweeteners to be used like regular table sugar, they are often mixed with a bulking agent such as maltodextrin or erythritol. These bulking agents add just a few calories when you use these non-caloric sweeteners. One packet of Equal or Splenda contains 4 calories and the sweetness of two teaspoons of sugar.

**Source:** Barclay A, Sandall P, Schwede-Slavin C. The Ultimate Guide to Sugars and Sweeteners: discover the taste, use, nutrition, science and lore of everything from agave nectar to xylitol. New York, NY: The Experiment, LLC; 2014.

CALORIC		LOW-CALORIC		NON-CALORIC						
<b>Maple Syrup</b>	<b>Molasses</b>	<b>Allulose</b>	<b>Sugar Alcohols</b>	<b>Acesulfame K</b>	<b>Aspartame</b>	<b>Monk Fruit</b>	<b>Neotame</b>	<b>Saccharin</b>	<b>Stevia</b>	<b>Sucralose</b>
<b>SOURCE:</b> Sap of the maple tree	<b>SOURCE:</b> Sugar cane plant	<b>SOURCE:</b> Corn	<b>SOURCE:</b> Corn	<b>SOURCE:</b> N/A	<b>SOURCE:</b> N/A	<b>SOURCE:</b> Monk fruit (a small melon)	<b>SOURCE:</b> N/A	<b>SOURCE:</b> N/A	<b>SOURCE:</b> Stevia plant	<b>SOURCE:</b> N/A
										
<b>SUGARS:</b> Sucrose, glucose, fructose	<b>SUGARS:</b> Sucrose, glucose, fructose	<b>SUGARS:</b> Allulose	<b>SUGARS:</b> Glucose	<b>SUGARS:</b> Glucose	<b>SUGARS:</b> N/A	<b>SUGARS:</b> Mogrosides	<b>SUGARS:</b> N/A	<b>SUGARS:</b> N/A	<b>SUGARS:</b> N/A	<b>SUGARS:</b> N/A
Calories per teaspoon: <b>17</b>	Calories per teaspoon: <b>19</b>	Calories per teaspoon: <b>1.6</b>	Calories per teaspoon: <b>0.6-8</b>	Calories per teaspoon: <b>0</b>	Calories per teaspoon: <b>0</b>	Calories per teaspoon: <b>0</b>	Calories per teaspoon: <b>0</b>	Calories per teaspoon: <b>0</b>	Calories per teaspoon: <b>0</b>	Calories per teaspoon: <b>0</b>
<b>GI: low</b>	<b>GI: moderate</b>	<b>GI: N/A</b>	<b>GI: varies</b>	<b>GI: N/A</b>	<b>GI: N/A</b>	<b>GI: N/A</b>	<b>GI: N/A</b>	<b>GI: N/A</b>	<b>GI: N/A</b>	<b>GI: N/A</b>

## SWEETNESS COMPARED TO SUGAR

Slightly less sweet	25-50% less sweet	70% as sweet	30-100% as sweet	200 times sweeter	150-250 times sweeter	200-400 times sweeter	8,000 times sweeter	300-500 times sweeter	200 times sweeter	400-600 times sweeter
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<p><b>PRODUCTION</b> The maple tree is tapped so the sap can be collected in buckets that hang on the tree. The sap is then boiled to reduce the water content, concentrating the sugars.</p> <p><b>NOTES</b> Contains traces of organic acids, vitamins and some minerals, however not a significant level.</p>	<p><b>PRODUCTION</b> Molasses is a co-product of sugar refining. It is spun off the raw sugar in a centrifuge. The first spin produces light molasses, while later spins produce darker molasses.</p> <p><b>NOTES</b> May contain trace amounts of iron, calcium and phosphorus. Sugar beets also naturally contain molasses but it is not used in the food supply.</p>	<p><b>PRODUCTION</b> Allulose is a "rare sugar" naturally present in wheat, figs and raisins. However, it is manufactured from corn through enzymatic reactions.</p> <p><b>NOTES</b> Allulose has the same chemical formula as fructose but is arranged differently. It isn't metabolized by the body and may cause GI distress similar to sugar alcohols.</p>	<p><b>PRODUCTION</b> While sugar alcohols can occur naturally, most are produced industrially from sugars (pentoses and hexoses). Sorbitol and xylitol are hydrogenated with a nickel catalyst. Erythritol is made through fermentation of glucose and sucrose.</p> <p><b>NOTES</b> Sugar alcohols are considered tooth friendly. Excess consumption of sugar alcohols can cause diarrhea. This is because the body ferments them in the gut.</p>	<p><b>PRODUCTION</b> Acesulfame K, or aceK, is a potassium salt. It is made by combining acetoacetic acid and potassium.</p> <p><b>NOTES</b> As a tabletop sweetener, it is always mixed with at least one other ingredient to reduce the sweetness to compare to table sugar. Brand name Sweet One or Sunett.</p>	<p><b>PRODUCTION</b> Aspartame is a methyl ester of aspartic acid/phenylalanine dipeptide. Typically aspartame is made through chemical synthesis.</p> <p><b>NOTES</b> Breaks down in the body to aspartic acid, phenylalanine and a small amount of methanol. Brand names are NutraSweet or Equal.</p>	<p><b>PRODUCTION</b> Monk fruit naturally contains sucrose, glucose and the high-intensity sweetener mogroside. Extracting the mogrosides involves crushing the fruit, adding water, filtering and spray drying.</p> <p><b>NOTES</b> It is challenging stevia as the next "natural" high-intensity sweetener as it is heat stable, acid stable and soluble in water. Also called Lou Han Guo.</p>	<p><b>PRODUCTION</b> Neotame is a derivative of the amino acids phenylalanine and aspartic acid.</p> <p><b>NOTES</b> It is heat stable, so it can be used in baking. Brand name is Newtame.</p>	<p><b>PRODUCTION</b> Saccharin is a sodium salt, made through the oxidation of o-toluensulfaonamide and or/phthalic anhydride.</p> <p><b>NOTES</b> It can provide a bitter or metallic aftertaste. Saccharin crosses the placenta and is secreted in breastmilk. It is not metabolized in the body and excreted in the urine. Brand name SweetN' Low or Sweet and Low.</p>	<p><b>PRODUCTION</b> The leaves are boiled, then the liquid is passed through a resin and washed in alcohol to release the sweet glycosides. These are then re-crystallized to produce the commercial product. Seven glycosides have been extracted, the two most commonly used are stevioside and rebaudioside A (Reb A).</p> <p><b>NOTES</b> Stevia can leave a bitter aftertaste. Stevia consumer products are often mixed with erythritol or sugar.</p>	<p><b>PRODUCTION</b> Manufactured through chlorination of sucrose in a multistep synthesis.</p> <p><b>NOTES</b> When combined with maltodextrins (used as bulking agents) there is a small contribution to energy. It is also stable in heat, so can be used in baking. Brand name Splenda.</p>
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