

# Glucose-fructose syrup

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An ingredient worth knowing



# GLUCOSE-FRUCTOSE SYRUP, A PLANT-BASED INGREDIENT

Glucose-fructose syrup\* is a **plant-based sugar**, made from grains. EU starch manufacturers only use conventional (non-GMO) wheat and maize which are almost exclusively domestically produced.

Unlike glucose syrup which contains no fructose, glucose-fructose syrup is made up of **two simple sugars: glucose and fructose**. Unlike sucrose (white sugar), which has a 50% fructose / 50% glucose content, its fructose content may vary.

The EU, which has a high volume and variety of agricultural crops, produces sugar from beet crops (sucrose) and **from grains**, for example glucose-fructose syrup. These are used in a number of different drinks and food products, not only for their **sweetening properties** but also for **additional useful properties** which make them an **important ingredient in certain recipes**.

\* Also known in Europe as isoglucose



## DID YOU KNOW?

**How can you identify glucose-fructose syrup in food products?**

**Added sugars** (sugar, glucose syrup etc.) must be indicated and **explicitly named** in the list of product ingredients.

Still have questions about starch and starch-based ingredients in food?  
VISIT [WWW.STARCHINFOOD.EU](http://WWW.STARCHINFOOD.EU) TO LEARN MORE.



# GLUCOSE-FRUCTOSE SYRUP, A CUSTOM-MADE INGREDIENT

In EU the fructose content of glucose-fructose syrup is usually around 20 to 30%. Depending on its use, this may vary to ensure the appropriate sweetness level.

In the USA, glucose-fructose syrup\* generally comes in two varieties, with a 55% fructose content (HFCS 55) and a 42% glucose-fructose syrup (HFCS 42).

CARBOHYDRATES	RELATIVE SWEETNESS LEVEL	FRUCTOSE CONTENT
Fructose	130	100
Sucrose = White sugar (benchmark)	100	50
HFCS 55 (42)	100 (90)	55 (42)
Glucose-fructose syrup (in EU)	75	20 to 30
Pure glucose (dextrose)	70	0
Glucose syrup	50 to 60	0

Source: FFAS, 2014. Le fructose, Etat des lieux du Fonds français pour l'alimentation et la santé.

Glucose-fructose syrup comes in **liquid form** which makes it easier to mix with products such as drinks, than solid sugars.

It can provide **texture, volume, taste, glossiness**, improved stability and a longer shelf-life for the products to which it is added. It also adds sweetness, at a level somewhere between glucose syrup and sucrose, in accordance with its fructose content.

## MOISTNESS SOFTNESS, TEXTURE



Bakery products,  
biscuits, cakes

## VOLUME



Marshmallows,  
ice creams, sorbets, etc.

## GLOSSINESS TRANSPARENCY



Desserts, icing,  
sweets

## ANTI-CRYSTALLISATION (SUGAR AND WATER)



Sweets, jam,  
ice creams, sorbets, etc.

\* In the USA it is also referred to as HFCS (High Fructose Corn Syrup). It is made exclusively from maize.

# HIGHLY-VALUED PROPERTIES, MODERATE CONSUMPTION

**Glucose-fructose syrups are part of the carbohydrates food group.** They have a calorific value of **4 kcal/g**. The European Food Safety Authority (EFSA) recommends that carbohydrates form 45-60% of our overall energy intake, stating that “enjoyed occasionally and in reasonable quantity, sweetened products are compatible with a balanced diet”.

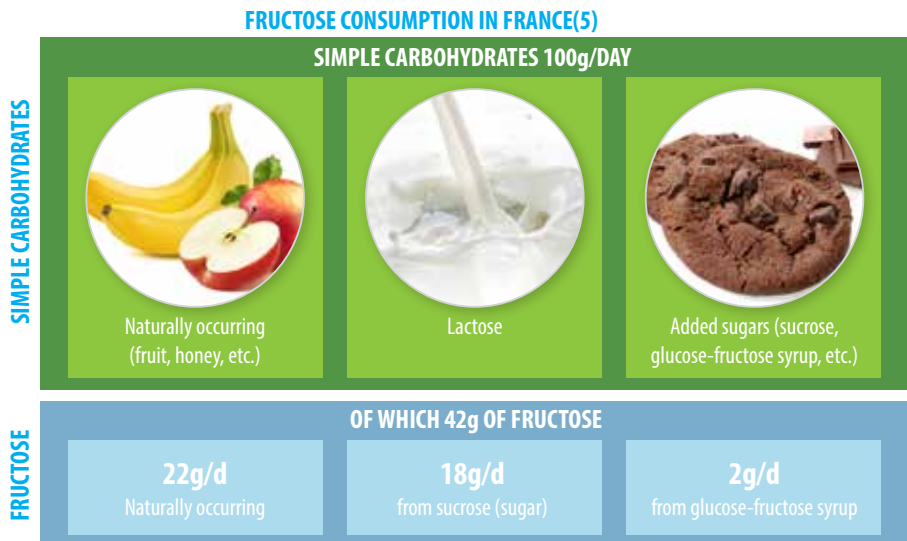
Scientific studies have examined the effect of sugar consumption on health. There is no correlation between normal fructose consumption and triglyceride levels, Body Mass Index, waist size or type II diabetes(1), nor between glucose-fructose syrup consumption and non-alcoholic fatty liver disease (1,2,3).

There are numerous factors pertaining to excess weight and obesity: lack of physical activity, a poorly balanced diet, social and genetic factors, etc. One single factor such as the consumption of sugar cannot be the sole cause of the epidemic. It is important to strike **a balance between energy intake and expenditure**(4).

## FRUCTOSE FACTS AND FIGURES

In France, the EU's largest starch producer and the market for which the most data and research exists, average fructose consumption is estimated at 42g per day, per person(5) . Of these **42g/d**, **only 2g comes from glucose-fructose syrup** (i.e. less than 5%).

Therefore the amount of fructose consumed in the form of glucose-fructose syrups is low.



(1) Jalal et al., 2010. Increased fructose associates with elevated blood pressure. J Am Soc Nephrol. doi: 10.1681/2009111111.

(2) Chiu et al., 2014. Effect of fructose on markers of non-alcoholic fatty liver disease (NAFLD): a systematic review and meta-analysis of controlled feeding trials. Eu J Clin Nutr, 68:416-423.

(3) Chung et al., 2014. Fructose, high-fructose corn syrup, sucrose, and non-alcoholic fatty liver disease or indexes of liver health: a systematic review and meta-analysis. AJCN. doi: 10.3945/114.086314

(4) Van Buul et al., 2014. Misconceptions about fructose-containing sugars and their role in the obesity epidemic. Nutrition Research Reviews, doi:10.1017/S0954422414000067.

(5) FFAS, 2014. Le fructose, Etat des lieux du Fonds français pour l'alimentation et la santé.

# TRANSFORMING STARCH INTO GLUCOSE-FRUCTOSE SYRUP



1

**EU farmers** cultivate the crops required to produce starch. Glucose-fructose syrup is generally derived from wheat and maize, the cultivation of which involves the work of **40,000 agricultural workers**.



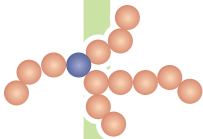
2

**Starch milk production.** Water is used to separate components of the grain. **For maize**, the grain is soaked in water. **For wheat**, water is added to the flour obtained after milling and sieving. The starch milk is then separated from the other grain components, such as proteins.



3

**Glucose syrup production.** Starch is broken down, using similar processes to those which occur in the human body when consuming starch-based foods, in a **process known as starch hydrolysis**.



4

**Glucose-fructose syrup production.** Another enzyme transforms certain glucose molecules into fructose.



5

Water evaporation results in a concentrated glucose-fructose syrup. It is then packaged and delivered to customers in the food sector.

Still have questions about starch and starch-based ingredients in food?  
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# OVERVIEW

**Glucose-fructose syrup is a sugar of natural origin.** In the EU it is derived from (non-GMO) wheat and maize starch.

Glucose-fructose syrup is a **high-quality ingredient** produced in EU starch manufacturing plants, employing over **15,000 workers**. Their raw materials are sourced almost exclusively from **EU crops**.

The average composition of glucose-fructose syrups in the EU is **70-80% glucose and 20-30% fructose**. The **average consumption of fructose** from glucose-fructose syrup sources in France is **just 2g per person per day** (of a daily total of 42g).

Glucose-fructose syrup is designed to be used in the manufacture of certain products. It has **complementary properties** to white sugar (sucrose).

Glucose-fructose syrup is a **simple carbohydrate**. Sugars, in common with all foodstuffs, should be consumed in reasonable quantities and as part of a healthy, varied diet and in accordance with the body's physical demands.

