

# SUGARS



Erasmus+

by France



## sugars molecules

Sugars belong to the carbohydrates family.

The carbohydrates are a nutrient like the proteins, fats...

They are essential for the functioning of the body and act as fuel on the muscles and the brain.

But it's also a source of pleasure.

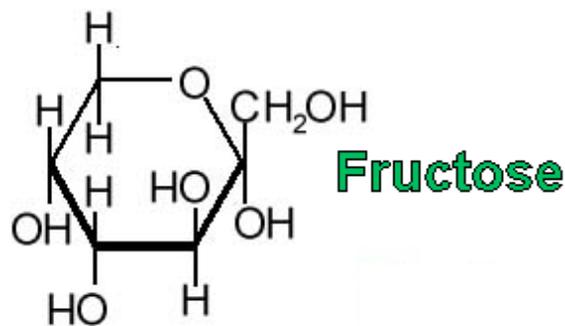
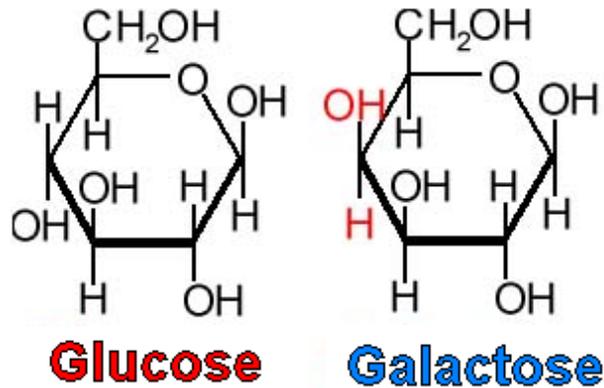
## The different types of sugars :

There are three different types of carbohydrates

N°1 – Monosaccharides : they are the simplest forms of sugars.

Their molecular formula is  $C_6H_{12}O_6$

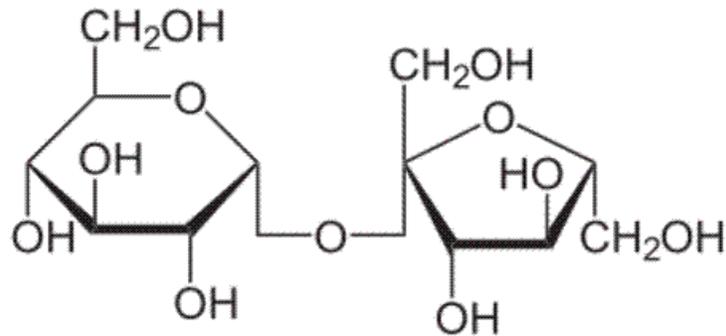
- glucose ♦
- fructose ♣
- galactose ♠



N°2 – Disaccharides : they are carbohydrates composing of two monosaccharides.

(examples)

- saccharose (♦+♣) extracted from the sugar beet.
- maltose (♦+♦) in cereals and candies.
- lactose (♠+♦) found in milk.



**Glucose + Fructose = Saccharose**

...

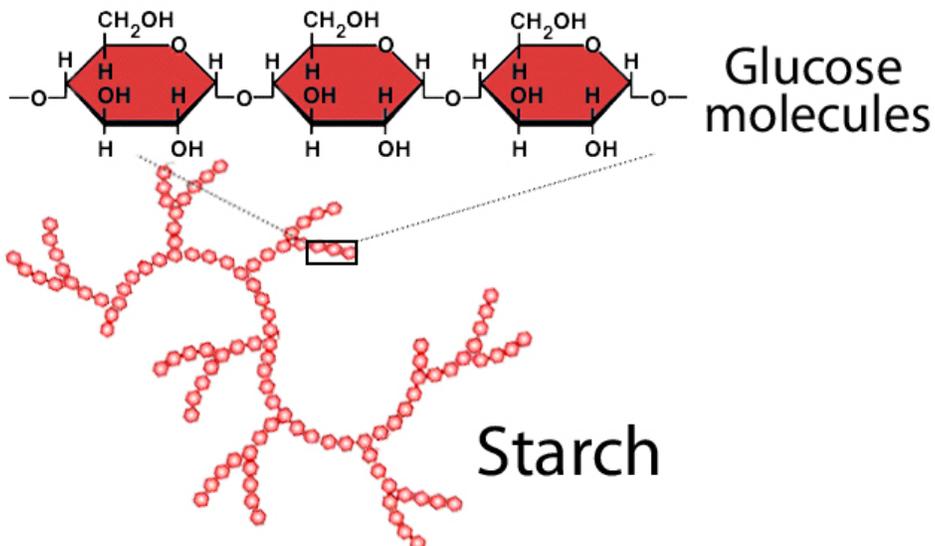
Remark : Sugar refers to saccharose molecule

N°3 – Polysaccharides : they contain very long chains of hundreds or thousands of monosaccharides units.

(exemple)

- starch : it's an energy storage molecule.
- glycogen : it is used by our body to store sugar and provide energy.
- cellulose : it's synthesized by plants.

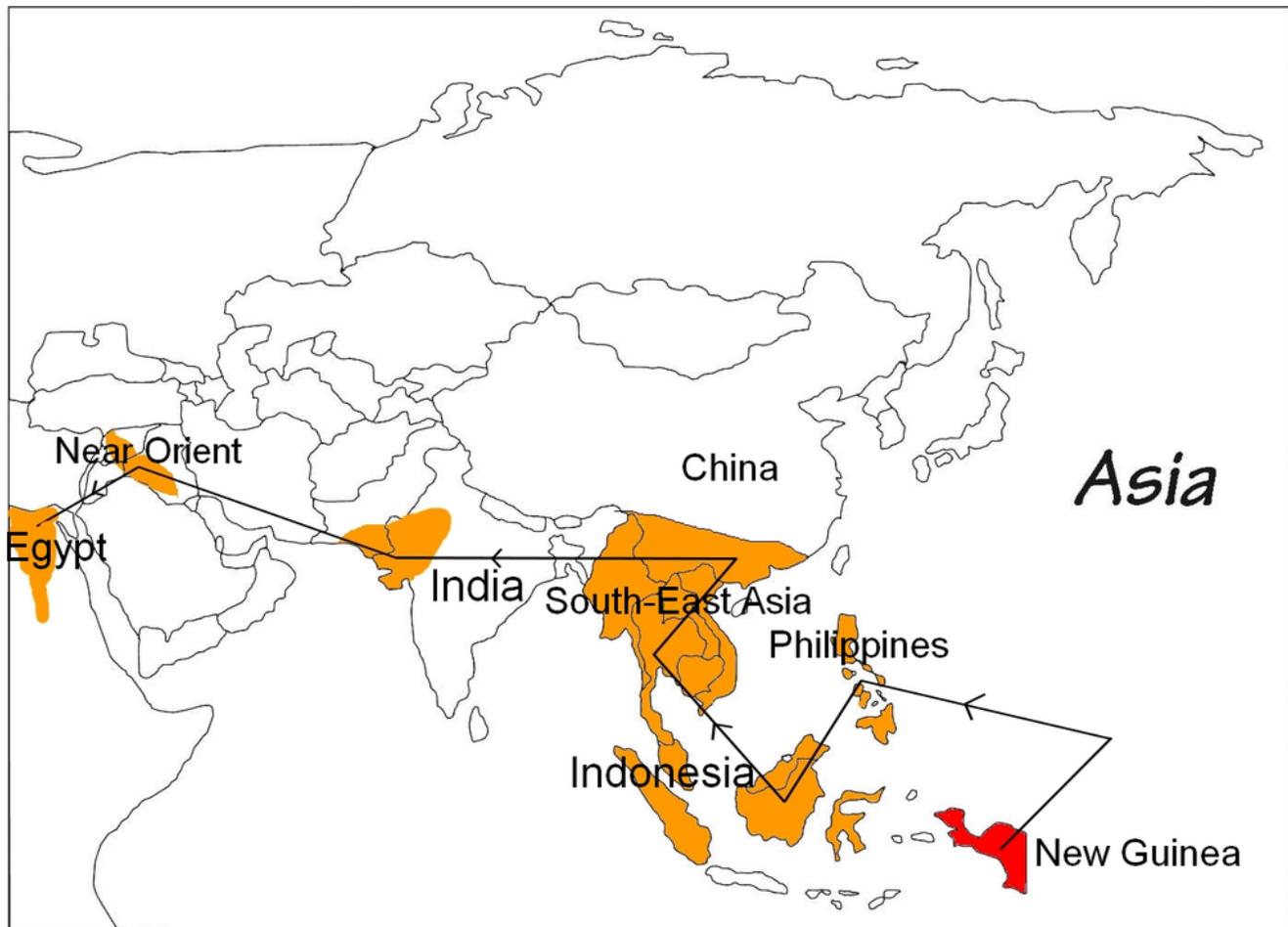
## Starch



## History of sugar

### From the Orient to the Crusades

Sugar cane came from Asia many milleniums before J.C.



It was introduced in many countries. But sugar reached Europe only during the XIIth century. It's a rare spice.





## The great discovery

At the end of the XVIII's century, German scientists succeeded to produce sugar with beet.



## The French Empire

Napoléon the 1<sup>st</sup> encouraged the scientific research then the production of beet sugar. Sugar factories opened in the north of France.



## From the 19th century to nowadays

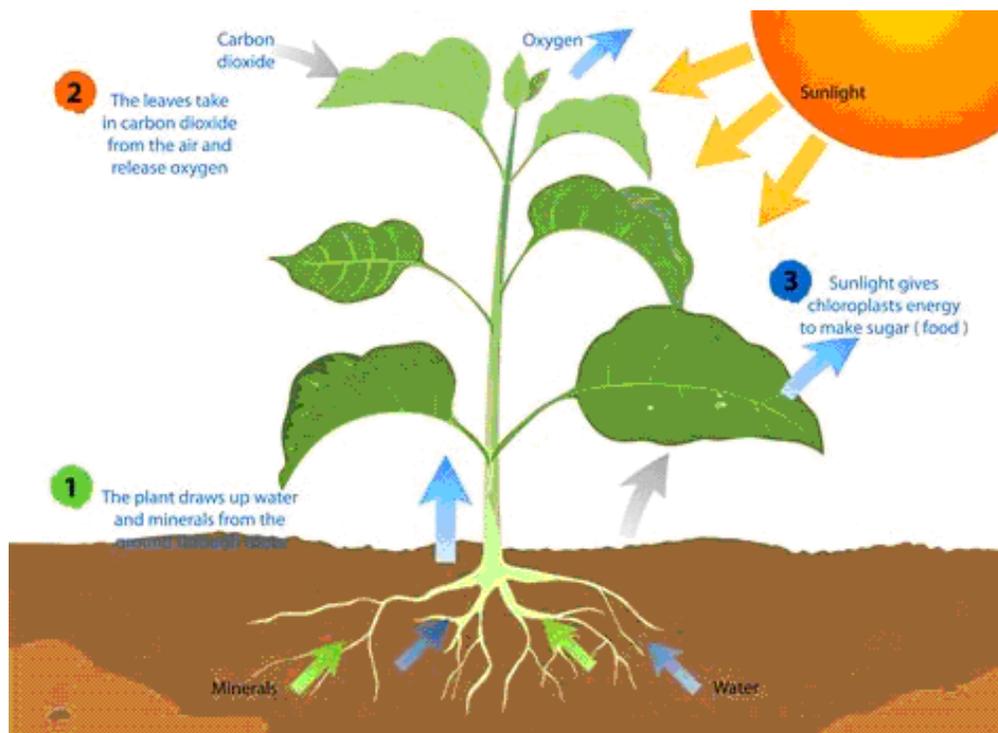
During the XXth century, sugar beet production and the sugar industry in France were in constant evolution: genetic and agronomic research to improve sugar yield.

In the 21st century, thanks in particular to information from satellites, beet producers improved their competitiveness and were more ecofriendly.

However, even if sugar produced from sugar beet has grown significantly over the last two centuries, sugar cane is still the most common sugar in the world. It covers 3/5 of the areas used for sugar production.

## Photosynthesis

Like all living organisms, plants need energy to live and to grow up. To achieve photosynthesis, a plant needs carbon, hydrogen and oxygen to form glucose ( $C_6H_{12}O_6$ ). During the night fructose ( $C_6H_{12}O_6$ ) is made. Then during the day, glucose and fructose go down into the roots to make stocks and it become saccharose ( $C_{12}H_{22}O_{11}$ ).



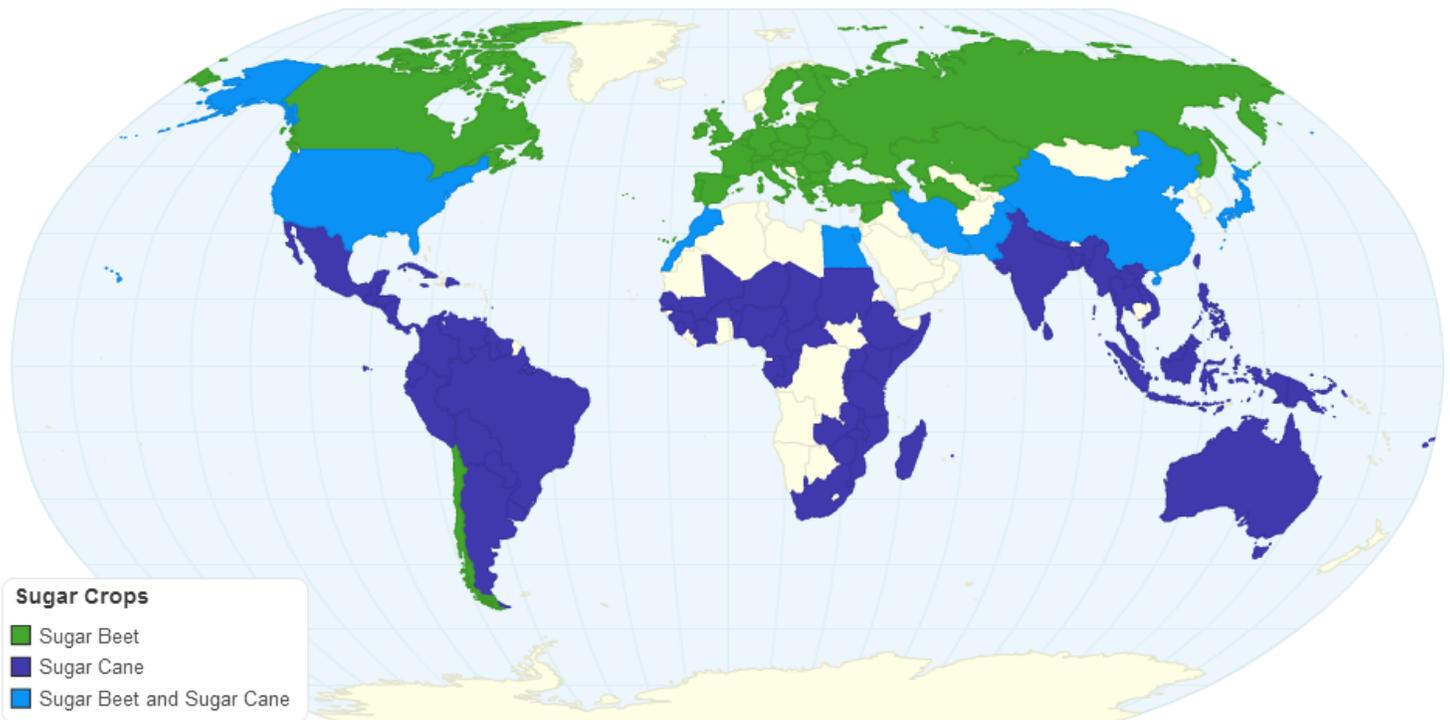
## Sugar economy

France is the first European producer of sugar, the first global producer of beet sugar and the ninth global producer of sugar.

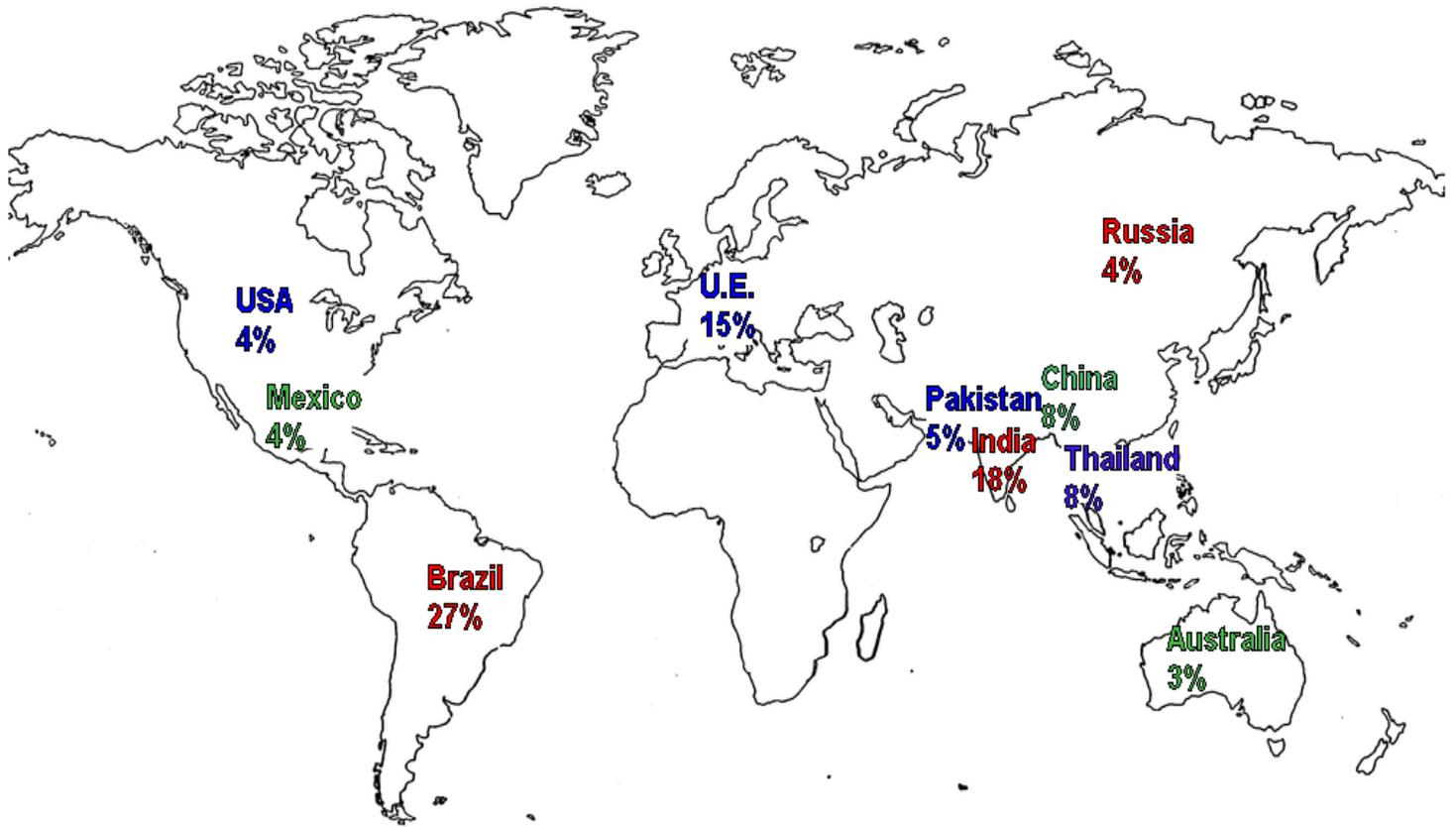
In 2017-2018 : The sugar production was of 6 million tons of beet sugar

- 50 % sold in France
- 30 % sold in the European Union
- 20% exported towards developing countries

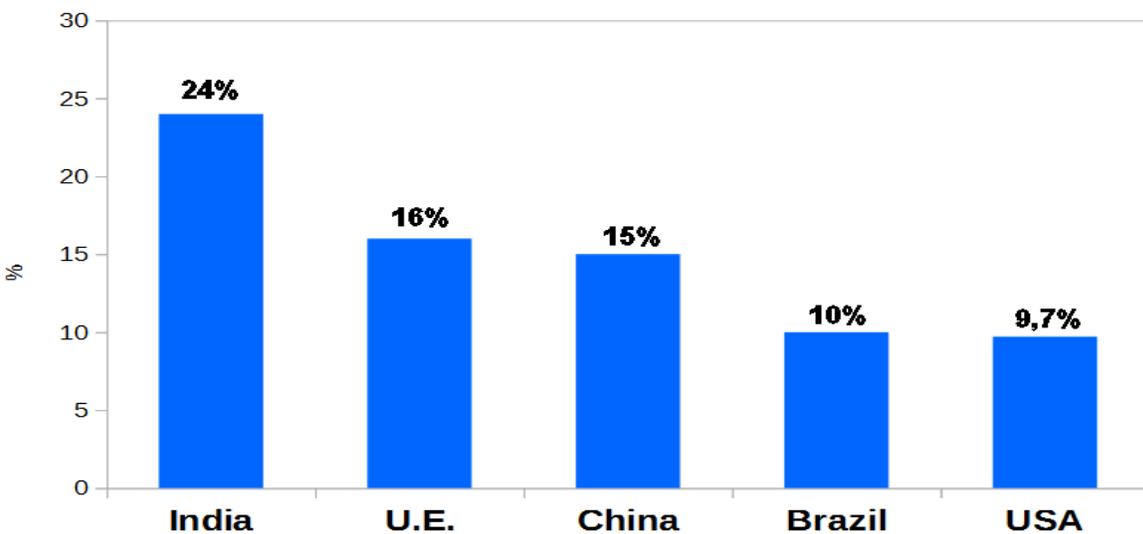
In the world in 2017-2018:



The 10 first producers ensure 78% of the global sugar production, so 140 million tons of sugar :



The 5 first users of sugars :

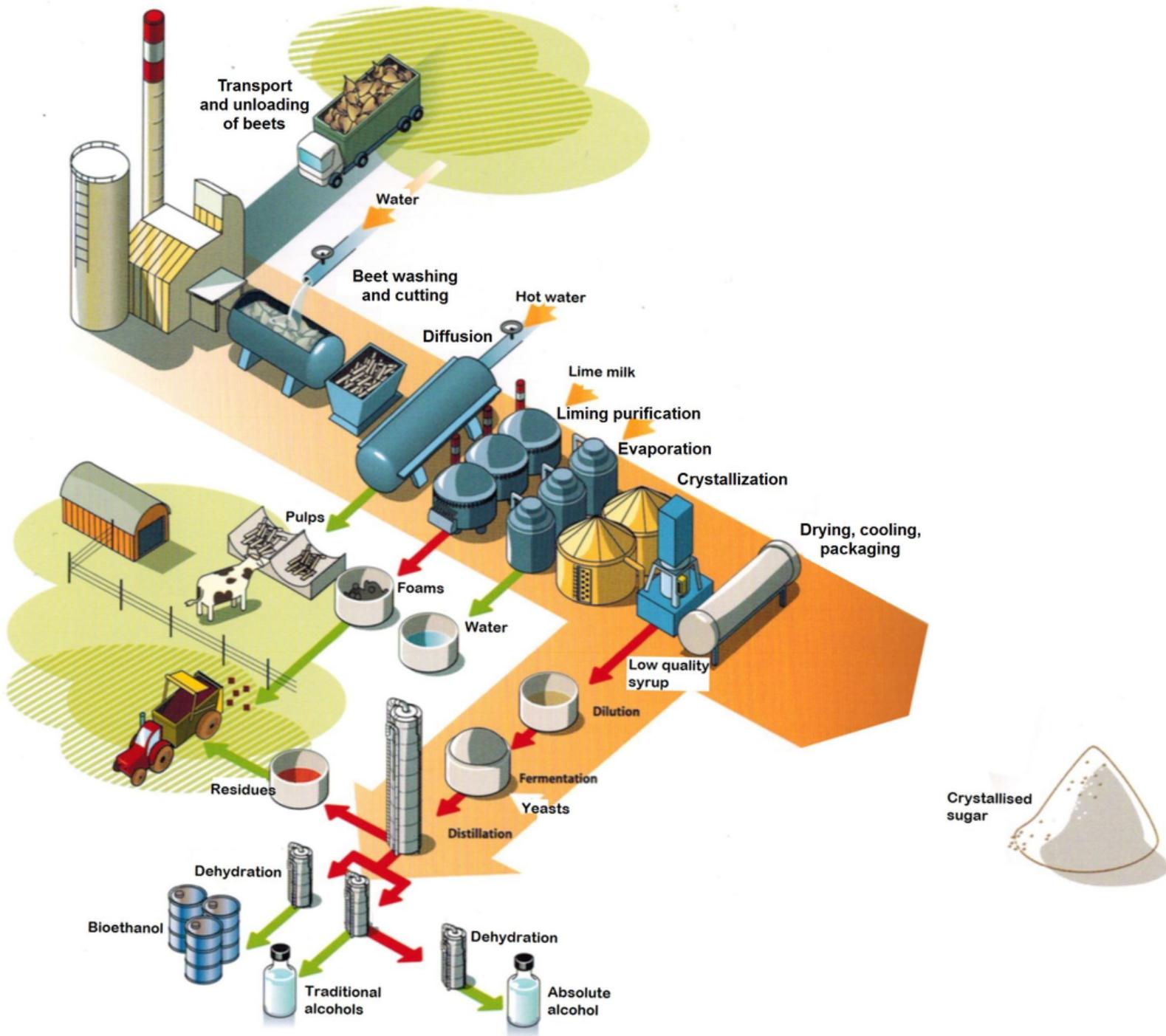


## The technique to produce sugar from Sugar Beets

We visited the old sugar factory of Francières, transformed into a museum about the production of sugar and the different uses of plants in our life (sugar, fuels, gas, etc.).

The sugar can be produced from Sugar Canes or Sugar Beets. Here, we will talk about the production of sugar from Sugar Beets.



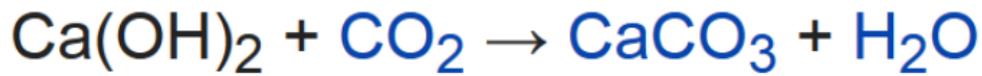


The beets come to the sugar factory after being harvested. The factory cleans the beets and cuts them into small pieces.

Those pieces of beets go with hot water (75° C) in a very big machine. Then, the sugar is extracted with the water but this solution contains a lot of impurities.

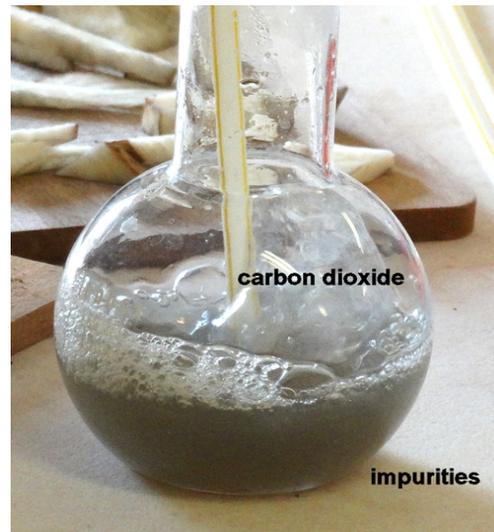
With lime-milk, the solution is cleaned.

The principle is : carbon dioxide is added to the solution and causes the limewater to precipitate as calcium carbonate, causing impurities to be removed.



When it is dry, the sugar is sent to the markets to be sold.

We can produce alcohol by using the low quality syrup.  
The residues are used for animal's food.



## THE DIFFERENT USES OF SUGAR



### The superfine sugar

It is obtained by the sieving and the mashing of the white granulated sugar. The dimension of the grains is 0,4mm. It's the basic sugar, use for the desserts, the baking, the cooking...



### The granulated sugar

Granulated sugar contains 99,9% of saccharose. It's collected after concentration, crystallization and spin drying. It's used for candies and pastries.



### Lump sugar

The lump sugar was invented in 1949 by Chambon Company. Its principle is based on a molding of moistened sugar and welded by compression. It's used for caramel and hot drinks.



### The icing sugar

It's a white fine granulated sugar which becomes a white impalpable powder. We add 3% of starch to avoid block formation. It is used for the decoration of dessert, the frosting, and the confection of meringue.



### The pearl sugar

It's a hard sugar got by compression of refined sugar. This sugar doesn't melt at the baking. It is used for the brioche and the chouquette.



### The sugar for marmalade

This sugar is a gelling sugar. It is used for the jelly, the marmalade and the sorbet. This sugar conserves the fruit.



### The vergeoise

The vergeoise isn't brown sugar. This sugar comes from the beet, annealed one or two times after refining to give it this blond color or brown color. It's used for pies and speculos. This sugar has a soft consistency.



### The candy sugar

The sugar candy is got by a slow crystallizing of concentrated and hot sugar. It's used for fruit brandy and liqueurs.

